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Marine Fisheries Abstracts

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Marine Fisheries Abstracts

UNITED STATES DEPARTMENT OF COMMERCE

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FOREWORD

The Department of Commerce's National Marine Fisheries Service publishes the monthly journal *Marine Fisheries Abstracts* as one means of communicating to the fishing industry and allied groups the status of current fishery research. The research includes the biological aspects of fishery science as well as technological studies dealing with aquatic resource supply, harvesting, processing, utilization, and distribution.

Marine Fisheries Abstracts contains summaries of selected articles from trade, engineering, and scientific journals dealing with the entire spectrum of fishery science. The publication is designed to serve the needs of fishery scientists, engineers, and managers in industry, academic institutions, and government by supplying timely information on current progress in fishery research and technology.

0.3 NOMENCLATURE POLICY: GENERIC DESCRIPTORS AND TRIVIAL NAMES FOR VITAMINS AND RELATED COMPOUNDS

Anonymous
Journal of Nutrition 104, No. 1, 144-150 (Jan. 1974)

This nomenclature policy of the Journal of Nutrition is based on the "Tentative Rules for Generic Descriptors and Trivial Names for Vitamins and Related Compounds" recommended by the International Union of Nutrition Sciences Committee on Nomenclature of the American Institute of Nutrition. Trivial names and generic descriptors for vitamins and related compounds are necessary relative to nutrition literature. The generic descriptor should be used to describe the family of compounds having vitamin activity and to modify such terms as "activity" and "deficency." Trivial names are used only to identify the specific compound. Synonyms for a specific chemical compound should not be used because they cause complications in indexing and computer retrieval. One name, therefore, should be used for each vitamin or related compound. Also, summation of the contributions to the dietary intake of different forms of the same vitamin is a practical necessity. For example, vitamin A and its provitamins summation should be made in mg (μg) retinol equivalent. If separate summation of provitamins is required, they should be expressed in mg (μg) β-carotene equivalent.
[3 references] FTP

0.32 TASTE PEPTIDE FRACTIONATION FROM A FISH PROTEIN HYDROLYSATE

Fujimaki, Masao, Soichi Arai, Michiko Yamashita, Hiromichi Kato (Dept. of Agricultural Chemistry, University of Tokyo, Tokyo, Japan), and Masatoshi Noguchi
Agricultural and Biological Chemistry 37, No. 12, 2891-2898 (Dec. 1973)

Studies are being carried out to improve the functional properties of fish protein concentrate (FPC). In the present work, several proteases were compared for their ability to produce desirable flavors from a FPC. Six commercial proteolytic enzyme preparations (pepsin, Rapidase, papain, Pronase, Molsin, and Bioprase) were tested for their ability to produce peptides possessing what the authors term favorable 'brothy taste peptides.' Preliminary tests showed that the commercial proteolytic enzyme preparation Pronase produced the largest amount of brothy taste products. Using Pronase as the test proteolytic enzyme preparation, a hydrolyzate was obtained from a practically odorless and tasteless FPC (the FPC was a commercial product produced by isopropanol extraction of eviscerated fish). The original color of the FPC was light brown and its composition was as follows: crude protein, 91.3%; fat, 0.1%; ash, 5.1%; and moisture, 4.8%. Nucleic acid-related substances were removed from the FPC product prior to the enzyme hydrolysis treatment. From the hydrolyzate of the nucleic acid-free FPC, an acidic fraction containing peptides of molecular weight less than 1,000 was prepared by ultrafiltration and subsequent treatment with activated charcoal and ion-exchange resins. To remove free aspartic and glutamic acids, the acidic fraction of the hydrolyzate was chromatographed on Amberlite CG-120.

0.38 (2.00) A STUDY OF SOME KINETIC PROPERTIES OF PARTIALLY PURIFIED PENAEUS SETIFERUS ARYLAMIDASE

Bauer, Beverly A., and R. R. Eitenmiller (Dept. of Food Science, University of Georgia, Athens, GA 30602)
Journal of Food Science 39, No. 1, 10-14 (Jan.-Feb. 1974)

Arylamidases catalyze the in vitro hydrolysis of amino acid-β-naphthylamides. It is likely that they may have a role in proteolysis and as such may be important in the spoilage of muscle foods. It has been suggested that there may be an orderly degradation of mammalian proteins, proceeding in a defined sequence. Proteins partially hydrolyzed by cathepsin D and collagenase may be further hydrolyzed by cathepsins and other peptidases. An understanding of the relationship of arylamidase to protein degradation may help clarify the reactions taking place during autolytic breakdown of muscle foods. This paper reports on the results of a study in which the partial purification of the arylamidase of the muscle of white shrimp was accomplished and some properties of the partially purified enzyme were determined.

Arylamidase was most active at pH 6.5 with lysyl-β-naphthylamide as the substrate. The enzyme is inhibited by puromycin, which differentiates its activity from that of the classical leucine amino peptidase activity (puromycin is an antibiotic that inhibits protein synthesis at the ribosomal stage by competing with amino-acid transfer RNA). Arylamidase does not require metal ions for its activity, but an increase in hydrolysis occurs upon the addition of Co^{++} or Mn^{++}.
[10 figures, 2 tables, 18 references] FTP

0.4 THE SCIENCE OF PHOTOBIOLOGY

Smith, Kendric C. (Dept. of Radiology, Stanford University School of Medicine, Stanford, CA 94305)
BioScience 24, No. 1, 45-48 (Jan. 1974)

In June 1972, the U.S. National Committee for Photobiology (National Academy of Sciences/National Research Council) announced its intention of forming the American Society for Photobiology. Since this announcement, over 700 scientists have joined the society including many from outside the Western Hemisphere.

The great number of ways that plants and animals are affected by light, both beneficially and detrimentally, is impressive. Yet, in most scientific experiments using animals and cells, the quality and quantity of light and its cyclical nature are totally ignored. Clearly, because of the unique physiological importance of light to all living things, the light environment of experiments must be accurately controlled in the same way that, for example, temperature and pH are controlled.

The goals of this new discipline can be divided into four categories: (1) the development of ways to protect organisms, including man, from the detrimental effects of light; (2) the development of ways to control the beneficial effects of light upon our environment; (3) the continued development of photochemical tools for use in studies of life processes; and (4) the development of photochemical therapies in medicine. The science of photobiology appears to have come of age as a major new frontier. SW

0.32

The results indicated that the so-called brothy taste of Pronase-hydrolyzed FPC is due not only to free glutamic acid but also to the acidic peptides of molecular weight less than 1,000. Furthermore, the low molecular weight (<1,000) fraction is responsible for the short-time taste effect of the FPC hydrolyzate, whereas the fraction of molecular weight greater than 1,000 is responsible for the long-time taste effect. Work is in progress to determine the amino-acid sequence of the individual peptides of the acidic peptide fraction.
[2 figures, 7 tables, 18 references] FTP

0.4 EXTRACTION OF URANIUM FROM SEA WATER BY CULTURED ALGAE

Helde, E. A., K. Wagener, M. Paschke, and M. Wald (Inst. Phys. Chem., Kernforschungsanlage Juelich, Juelich, Germany)
Chemical Abstracts 80, No. 5, 24837f (Feb. 4, 1974)

0.38 (2.00) CATHEPSIN ACTIVITY OF PENAEUS SETIFERUS MUSCLE

Eitenmiller, Ronald R. (Dept. of Food Science, University of Georgia, Athens, GA 30602)
Journal of Food Science 39, No. 1, 6-9 (Jan.-Feb. 1974)

The tissues of most aquatic species probably contain proteolytic enzymes that act on the tissues after death of the species leading to undesirable flavor and texture changes in the muscle. In this study, the author assessed the catheptic activity of the muscle of white shrimp (P. setiferus), and identified certain of the enzymes involved.

The muscle of white shrimp contains cathepsin D activity, but not cathepsin A, B, or C activity. Absence of cathepsins A, B, and C seems to indicate that shrimp muscle has a peptidase profile different from that of mammalian tissue. Other workers have postulated that joint action of cathepsin D with other cathepsins serves as a mechanism for the orderly degradation of protein in mammalian tissue. The absence of enzymes in white shrimp with specificities similar to cathepsins A, B, and C does not preclude the presence of other enzymes with different specificities being present that could participate in further degradation of the protein.

The cathepsin D enzyme in the white shrimp is optimally active against acid denatured hemoglobin and endogenous protein at 42° C and pH 3.0; it is optimally active against acid-urea denatured hemoglobin at pH 3.5. The enzyme is not active against casein or bovine serum albumin. EDTA, Ca^{++}, Zn^{++}, Co^{++}, Hg^{++}, and KCN inhibit the enzyme; but cysteine slightly activates the enzyme. N-ethyl-maleimide and p-chloromercuribenzoate do not alter the activity of the enzyme. Apparently, the cathepsin D activity exists primarily in a bound state in the muscle of the white shrimp. [2 figures, 4 tables, 27 references] FTP

0.4 (0.5) INJURIES TO DIVERS BY MARINE ANIMALS: A SIMPLIFIED APPROACH TO RECOGNITION AND MANAGEMENT

Strauss, Michael B. (U.S. Navy Hospital, San Diego, CA 92134), and William L. Orris (Scripps Institute of Oceanography, La Jolla, CA 92037)
Military Medicine 139, No. 2, 129-130 (Feb. 1974)

Of the 1,000 species of marine organisms that can inflict injuries to the diver, their injury mechanisms and subsequent treatments fall into five classes. The first (Class I) mechanism of injury is traumatic/lacerations which can be inflicted by, for example, a shark. The emergency treatment is to stop the bleeding. The Class II mechanism of injury is nematocyst/urticarial which can be inflicted by jellyfish, sea anemones, hydra, and corals. The emergency treatment for this type of injury is (1) inactivate the organism with alcohol, (2) coalesce and remove residual tentacles with powder, and (3) neutralize the toxic agent in the wound with soda or ammonia. The Class III mechanism of injury is spine/puncture that can be inflicted by sea urchin, cone shells, sting rays, and sculpins. The emergency treatment is to soak the injured part in as hot water as can be tolerated. The Class IV mechanism of injury is by fangs/venom that can be inflicted by the sea snake. The emergency treatment for this injury is the same for that of shock. The Class V mechanism of injury can be inflicted by electric fish and parasitic water worms, or through coral cuts and contaminated fish. Usually the symptoms do not appear while diving. The treatment is symptomatic, such as for rash, food poisoning, and festering wounds. Victims of marine animal injuries should be carefully examined and observed for complications. Shock and collapse are dreaded complications of shark wounds, contact with the Australian sea wasp and jellyfish, and injury from the spines of the Indo-Pacific stonefish. Steroids, antihistamines, analgesics, 100% oxygen, intravenous fluids, antibiotics, and antivenoms may be required. [1 table, 2 references] SW

0.5 GLUCOSE INHIBITS GROWTH OF CLOSTRIDIUM PERFRINGENS IN FOOD PROTEINS

Schroder, D. J., and F. F. Busta (Dept. of Food Science and Nutrition, University of Minnesota, St. Paul, MN 55101)
Journal of Milk and Food Technology 37, No. 1, 4-10 (Jan. 1974)

In earlier work on the effects of food components on the growth of C. perfringens, the authors found that adding D-glucose to a sodium caseinate or isolated soy protein medium extended the lag phase of growth. In the present study, they found that 10 g glucose per liter in a sodium caseinate medium containing NaCl, K_2HPO_4, Na_2SO_4, and sodium thioglycollate increased the lag time of C. perfringens strain S40 to 3.5 h (the lag time for the control with no glucose was 2 h). When Trypticase (2 g/l) or Fe^{++}, Ca^{++}, or Mg^{++} (1 mM) were added, the glucose inhibition effect was negated. The glucose inhibitory effect was also noted when amino acids were used to replace the calcium caseinate and the amount of cations was controlled (by adding low levels) or by adding EDTA. Fructose or lactose did not produce the inhibitory effect. The extent of the lag time varied with the level of added glucose or with the level of added inoculum. There was a direct linear relationship between the log of the glucose concentration added per cell of C. perfringens and the lag time. The mechanism of the glucose inhibition seems to involve competition by food proteins for cations that affect the glucose transport system(s). The authors conclude that glucose may be an influential ingredient for the control, delay, or at least affect the initial growth of C. perfringens in certain fabricated protein foods.
[7 figures, 5 tables, 20 references] FTP

0.5 DETECTION OF STAPHYLOCOCCAL ENTEROTOXIN IN FOODS

Reiser, Raoul, Donna Conaway, and Merlin S. Bergdoll (Food Research Institute, University of Wisconsin, Madison, WI 53706)
Applied Microbiology 27, No. 1, 83-85 (Jan. 1974)

The current recommended method for the detection of staphlococcal enterotoxins in foods is time consuming and laborious. Other workers have reported procedures in which the enterotoxins in food extracts were partially purified by means of ion-exchange columns. In a newly developed procedure, the enterotoxin is adsorbed on an ion-exchange resin and then subjected to proteolytic digestion. The time required for analysis was reduced to 3 days.

Samples of cheese that had been contaminated with enterotoxin A at levels of 1, 0.5, 0.25, and 0.125 µg/100 g were ground, slurried with 1.0 M HCl, and centrifuged at 4° C. The supernatant was adjusted to pH 7.5, extracted with trichloromethane, and centrifuged. The water layer was separated, readjusted to pH 4.5, and recentrifuged. The supernatant fluid was adjusted to pH 7.5, mixed with CG-50 ion-exchange resin (20 ml per 100 ml supernatant) and stirred at 4° C for 1 h. The mixture was filtered and the residue was washed with 0.015 M sodium phosphate buffer (pH 5.9) containing 0.09% NaCl. The enterotoxin was eluted from the resin with 30 ml of 0.15 M dibasic sodium phosphate containing 0.9% NaCl, adjusting the pH to 6.8, and stirring at 4° C for 45 min. The mixture was filtered, and portions of the filtrate containing the enterotoxin were either analyzed by the reversed passive hemagglutination (RPHA) method described by S. J. Silverman, A. R. Knott, and M. Howard [Appl. Microbiol. 16, 1019-1023 (1968)] or treated for use

0.5 (1.951)(1.952) A PRELIMINARY REPORT ON POTENTIALLY PATHOGENIC MICROBIOLOGICAL AGENTS RECENTLY ISOLATED FROM PINNIPEDS

Smith, Alvin W., Catherine M. Prato, William G. Gilmartin (Naval Undersea Center, San Diego, CA 92133), Richard J. Brown, and Mark C. Keyes
Journal of Wildlife Diseases 10, No. 1, 54-59 (Jan. 1974)

Earlier reports have indicated that California sea lions harbored Leptospira that were taxonomically comparable with organisms isolated from land animals. In addition, Neisseria mucosa var. Heidelbergensis isolated from cetaceans was identical to isolates causing pneumonia in children.

This report contains preliminary findings on some potentially pathogenic microbiological agents which have been isolated from two groups of pinnipeds; sea lions on San Miguel Islands which had a previously reported high incidence of abortion and fur seals on St. Paul Island, Alaska. The organs of individuals from both groups were sampled and prepared as inocula to isolate viral, fungal, mycoplasma, and Leptospira organisms.

Leptospira were isolated from specimens from both groups of pinnipeds, and may have been the cause of abortions in these animals. Of seven virus isolates from the animals, one from fur seals and two from the sea lions, in their host range, morphology, and physicochemical properties were similar to the virus that causes vesicular exanthema in swine. In the seven virus isolates, there appeared to be two serotypes. The fungus, a species of Scopulariopsis, was isolated from the animals but caused no infection. Fungi of this genus have been repeatedly isolated from the superficial and deep mycotic lesions in man. In addition, these

0.5 (0.6) DIRECT ADDITION OF LIQUID PROPYLENE OXIDE TO DRIED MATERIALS FOR DESTRUCTION OF SALMONELLAE

Tompkin, R. B., and S. K. Stozek (Swift & Co., Research and Development Center, Oak Brook, IL 60521)
Applied Microbiology 27, No. 1, 276-277 (Jan. 1974)

Propylene oxide (PO) is usually applied as a gas to products in a sealed chamber in batch type processes. Experiments were performed to determine the effectiveness of liquid PO in destroying salmonellae in a dry product.

Three species of Salmonella--typhimurium, anatum, and montevideo--were cultured and pooled. The pooled suspension (1 ml) was added to 100 g of meat and bone meal (containing 6.2% moisture, 10.2% fat, 50.8% protein, and 27.8% ash). The inoculated mixture was placed in 1-pint glass, screw-capped jars; each jar was mixed with PO in concentrations ranging from 100 µg/g to 12,000 µg/g. The jars were sealed, shaken, and stored at about 24° C. After 3 days and 21 days, respectively, of exposure to PO, samples were taken to determine the counts of aerobic organisms and salmonellae. The results indicate that after 3 days' incubation without PO the counts for aerobes and salmonellae were 54 million and 44 million per gram; at a PO concentration of 1,500 µg/g the counts were 520,000 and 13,000, respectively.

The effectiveness of liquid PO suggests the possibility that it could be metered into a stream of moving product during bagging or loading. The PO vaporizes and diffuses throughout the product. This procedure may be an economical and effective alternative to terminal heating to destroy salmonellae in dried foods

0.5 FREE AND OCCLUDED VIRUS, SIMILAR TO BACULOVIRUS, IN HEPATOPANCREAS OF PINK SHRIMP

Couch, John A. (Gulf Breeze Environmental Research Laboratory, U.S. Environmental Protection Agency, Sabine Island, Gulf Breeze, FL 32561)
Nature 247, No. 5438, 229-231 (Jan. 25, 1974)

In 1972, various workers described Herpes-type virus from an estuarine fungus and from oysters. In the present article, the author describes rod-shaped virus particles in cells of pink shrimp (Penaeus duorarum) that were experimentally exposed to polychlorinated biphenyl (PCB), Aroclor 1254. These particles were similar to certain noninclusion viruses and to nuclear polyhedrosis viruses of the Baculovirus group previously described only from insects and mites. So far the author found the virus only in shrimp taken from near Cedar Key, Fla., and experimentally exposed to the toxic chemical. He believes, however, that the virus is probably a natural parasite, previously undetected, of estuarine and marine shrimp. Future studies on the possible interactions of PCB and virus in pink shrimp may provide useful information that might clarify the relationship between natural infectious diseases and pollutant chemicals in the environment.
[5 figures, 13 references] FTP

0.5 (0.6)

and feeds. The concentration of PO required to reduce the counts of these organisms depends upon level of contamination, relative humidity, exposure time, and other factors. The resistance of gram-negative rods to PO vapor decreases with increasing relative humidity, and increasing the exposure time of the product to PO vapor further reduces the counts. The authors suggest that it should be possible to develop a process in which the treated product would meet the 300 µg/g residual PO limit now required for food treated with PO in a gas form [Code of Federal Regulations. Title 21--Food and Drugs. Section 121.1076, p. 149, U.S. Government Printing Office, Washington, D.C. (1972)]. In addition, safety, nutritional, and toxicological aspects of PO must be considered.
[2 tables, 10 references] MW

0.5

with microslides in the following manner. The filtrate was mixed with 1 g of purified agar and stirred for 1 h at 4° C. The mixture was filtered and the filtrate was dialyzed in 50% Carbowax 20-M overnight at 4° C. After soaking the dialysis sac in warm water for 10-20 min, the contents were removed by rinsing three times in distilled water not exceeding a total of 5 ml. The dialyzate was mixed with 0.5 ml trichloromethane and centrifuged. The water layer was lyophilized, dissolved in 0.2 ml 1% trypsin (in distilled water), and allowed to stand for ½ h before placing on microslides. The microslides were incubated for 24 h and analyzed by the method of V. L. and V. F. Zehren [A. J. Dairy Sci. 51, 635-644 (1968)]. The microslides were stained by modification of the method of E. D. Lumpkins, Sr. [Appl. Microbiol. 24, 499-500 (1972)] in the following manner. The slides were soaked in distilled water for ½ h before immersion for 20 min in a stain consisting of 1 g Woolfast pink, in a solution of 5% trichloroacetic acid, 1% glacial acetic acid, and 25% ethanol. The slides were then rinsed with water, and excess dye was removed by soaking in distilled water for ½ h.
The results indicate that the microslide technique and the RPHA method detected enterotoxin A at all the test levels in cheese, ham, and fermented sausage. The advantage of the microslide technique is that results can be obtained sooner than with the RPHA method.
[8 references] MS

0.6 (0.35)(9.3) FOOD ADDITIVES. I. [A REVIEW]

Shinoyama, S. (Tokai Regional Fisheries Res. Lab., Chuo-ku, Tokyo, Japan)
Technics of Refrigeration and Airconditioning 21, No. 246, 49-64 (1970) [In Japanese]
Part II. ibid, 21, No. 247, 57-68 (1970) [In Japanese]
Part III. ibid, 21, No. 248, 53-62 (1970) [In Japanese]
Food Science and Technology Abstracts 5, No. 12, 162, Abstracts Nos. 12T593, 12T594, and 12T595 (Dec. 1973)

Part I is a discussion of the food additives permitted in Japan. Part II considers the safety of food additives. Part III is a discussion of the Japanese regulations on food additives. FTP

0.6 (0.7)(9.19) [CARCINOGENIC SUBSTANCES IN FOOD PRODUCTS] KANTSEROGENY I PISHCHEVYE PRODUKTY

Neiman, I. M.
(Publisher) Izdatel'stvo Meditsina, Moscow, U.S.S.R. (1972), 152 pp. Price 0.88 r [In Russian]
Food Science and Technology Abstracts 5, No. 12, 11, Abstract No. 12C340 (Dec. 1973)

Some of the subjects considered in this book are: Sources of carcinogenic substances during packaging of foods during preparation processes, and carcinogenic materials affecting foods; formation of carcinogenic substances during chemical materials in foods; formation of carcinogenic substances during preparation processes, and carcinogenic materials affecting foods during storage and transport. FTd

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0.5 (1.951)(1.952) BIOCHEMICAL AND BIOPHYSICAL CHARACTERIZATION OF CALICIVIRUS ISOLATES FROM PINNIPEDS

Schaffer, Frederick L., and Marjorie E. Soergel (Sch. Public Health, Univ. California, Berkeley, Calif.)
Chemical Abstracts 80, No. 7, 34942a (Feb. 18, 1974)

0.5 (1.951)(1.952)

organisms were isolated from the normal skin of aquanauts participating in the Tektite-I 60-day submergence study in the Virgin Islands. Six mycoplasma isolates were made but they have not been fully characterized.
The authors suggest that the virus isolated from the marine mammals has broad economic implications as a possible threat to the food animal industry. The species of Leptospira and Scopulariopsis may possess zoonotic potential. In addition, they believe that this evidence emphasizes the importance of studies to define the disease interrelationships in our total environment.
[3 tables, 12 references] SW

0.4 (6.36) QUALITATIVE AND QUANTITATIVE CHARACTERISTICS OF ALGAE USED FOR WASTE WATER PURIFICATION

Shestakova, M. F. (U.S.S.R.)
Chemical Abstracts 80, No. 6, 30403c (Feb. 11, 1974)

0.5 UTILIZATION OF MARINE BACTERIA. I. PRELIMINARY SURVEY FOR SOME INDUSTRIAL ENZYMES

Katoh, Kiyoaki, Katsuya Yamamoto, and Haruo Shimano (Natl. Food Res. Inst., Tokyo, Japan)
Chemical Abstracts 80, No. 5, 25900h (Feb. 4, 1974)

0.7 (0.4) LIVER POLYSOME PROFILES AND PROTEIN SYNTHESIS IN RATS FED A THREONINE-IMBALANCED DIET

Ip, Clement C. Y., and Alfred E. Harper (Dept. of Biochemistry, University of Wisconsin, Madison, WI 53706)
Journal of Nutrition 104, No. 2, 252-263 (Feb. 1974)

Rats were fed a threonine-imbalanced diet to determine the effect on liver polysome aggregation and protein synthesis in vivo. The tests showed that hepatic polysome aggregation and protein synthesis are influenced by the level of threonine when it is the most limiting amino acid in the diet and that changes in the responses of these variables to ingestion of an imbalanced diet can be influenced by the prior nutritional state of the animal.
[7 figures, 6 tables, 31 references] FTP

0.7 BALANCED LOW-CALORIE VS. HIGH-PROTEIN-LOW-CARBOHYDRATE REDUCING DIETS. I. WEIGHT LOSS, NUTRIENT INTAKE, AND SUBJECTIVE EVALUATION

Worthington, Bonnie S., and Lynda E. Taylor (School of Home Economics, University of Washington, Seattle, WA 98105)
Journal of the American Dietetic Association 64, No. 1, 47-51 (Jan. 1974)

Any single therapy alone is not likely to be effective in treating all persons for obesity; however, dietary regulation is necessary in the overall management of obesity. In this study, the authors compared an isocaloric balanced low-calorie diet with a high-protein-low-carbohydrate diet to assess weight loss by, nutrient adequacy for, and acceptance to a group of obese women. The test group consisted of 20 women, ages 19 to 53 years. Ten subjects were maintained on the balanced low-calorie (control) (BL-C) diet and ten on the high-protein-low-carbohydrate (H-P-L-C) diet for 14 days. The women on the H-P-L-C diet lost more weight during the first week than did those on the BL-C diet. During the second week of the dietary regime the weight losses of the two groups were similar. Improved appetite satiety was not important in promoting greater weight loss during the first week, nor was increased specific dynamic action of the protein [I. M. Stillman and S. S. Baker, "The Doctor's Quick Weight Loss Diet," Prentice-Hall, New York, N.Y. (1967)] a major factor. In the H-P-L-C group, increased fluid and sodium losses induced by carbohydrate restriction probably contributed to the greater weight losses in the subjects of this group during the first week. Both diets showed about the same acceptability, but the limited range of foods for the H-P-L-C diet restricted variety in the daily menus and did not provide adequate amounts of vitamin A, ascorbic acid, iron, and calcium. [3 figures, 2 tables, 16 references] FTP

0.7 RECOMMENDED DIETARY ALLOWANCES: ARE THEY WHAT WE THINK THEY ARE?

Harper, Alfred E. (Committee on Dietary Allowances, Food and Nutrition Board, National Research Council-National Academy of Sciences, Washington, D.C.)
Journal of the American Dietetic Association 64, No. 2, 151-156 (Feb. 1974)

The Recommended Dietary Allowances, except for energy, historically have been recommendations for intake levels of nutrients sufficiently in excess of average nutritional requirements to meet the needs of nearly all the population. The intake levels are a public health or a statistical concept, and they are compatible with the maintenance of the health of most people. These levels are not required by all individuals; they are not absolute nutritional standards; and they are not recommendations for an ideal diet. They are, instead, "goals" at which to aim in providing for the nutritional needs of groups of people. Additionally, these goals are estimates of the amounts of nutrients great enough to meet the physiologic needs of most people and independent of the amounts that can be provided readily from the available food. Diets are more than combinations of nutrients; they comprise foods that should satisfy social and psychologic needs as well as nutritional needs. The foods must be palatable; therefore, the diets should be formulated from a wide variety of foods. The diet can then be compared to food composition tables and the Recommended Dietary Allowances to determine whether it contains the proper nutritional levels.

Allowances for energy are estimated on an entirely different basis from that for specific nutrients. Energy allowances are estimates of the requirements of

0.7 FOOD GUIDES IN THE UNITED STATES

Hertzler, Ann A., and Helen L. Anderson (Dept. of Human Nutrition, Foods, and Food Systems Management, College of Home Economics, University of Missouri, Columbia, MO 65201)
Journal of the American Dietetic Association 64, No. 1, 19-28 (Jan. 1974)

Dietary standards (quantitative recommendations for essential nutrients and calories) have been developed in the United States to promote optimal nutritional status in the population. One way that has been used to achieve this goal has been the translation of the standard recommendations into suggested servings of foods from groups arranged according to their primary nutrient contributions. These food guides are intended to assist the public in selecting foods that provide the recommended intake of essential nutrients. In this paper the authors review the evolution of our national food guides in order to broaden our understanding of the guides and their objectives. The evolution of the national food guides is reviewed from the five food groups developed by Caroline Hunt [USDA Farmer's Bulletin 717 (1916)] to the four food groups (Basic 4) introduced by L. Page and E. Phipard (USDA Home Economics Research Report No. 3 (1957)]. This review should help broaden one's understanding of the national food guides and their nutritional objectives.
[3 figures, 3 tables, 67 references] FTP

0.7

average persons in each age group and approximate the average need of the population group; they are not intakes for individuals. The low energy expenditure of the population of the United States has begun to concern the Committee on Dietary Allowances. The current pattern of low energy expenditure together with intake of sugars and oils that provide energy but only small quantities of essential nutrients has a potential for creating nutritional problems.

The article contains descriptions of allowances based on normal needs; the value judgments required with regard to such factors as age and weight; deriving allowances from nutritional requirements; and the limitations of recommending allowances for different groups in the population.

Criticism that the allowances are excessive is explained by the goals of the recommendations: they are high enough to meet the needs of those with the highest requirements, and therefore exceed the needs of most people. On the other hand, allowances should be based on realistic physiologic needs, and high allowances should not be proposed because of excess nutrients currently available.
[2 figures, 1 table, 10 references] SW

0.7 SULFUR UTILIZATION BY THE CHICK WITH EMPHASIS ON THE EFFECT
(0.4) OF INORGANIC SULFATE ON THE CYSTINE-METHIONINE INTERRELATIONSHIP

Sasse, Charles E., and David H. Baker (Dept. of Animal Science, University Illinois, Urbana, IL 61801)
Journal of Nutrition 104, No. 2, 244-251 (Feb. 1974)

This paper reports results of a feeding study with chicks on the effect of sulfate on the capacity of cystine to meet the need of sulfur-bearing amino acids (SAA), with dietary SAA set at either an adequate or a deficient level. Whole body composition, energy and protein retention, and the usual growth parameters of the chicks were determined. Also, assay was made to compare the efficacy of inorganic sulfate relative to cysteine. Cystine was added to purified diets to provide 0, 20, 40, 50, 60, or 70% of the total sulfur-bearing amino acids, with the balance coming from methionine. The effect of sulfate was evaluated at 0% and 0.10% dietary levels of K_2SO_4.

When the level of SAA was about adequate, the optimal percentage from cystine was 48.4% in the presence of dietary K_2SO_4 and 52.7% in the absence of K_2SO_4. When the level of SAA was deficient, the optimal performance occurred when cystine furnished 41.3% of the SAA need in the presence of dietary K_2SO_4 and 48.2% in the absence of dietary K_2SO_4. The response to inorganic sulfate was due to increased retention of protein and calories.

Another assay was carried out to determine the comparative effect of 0.10% dietary K_2SO_4 with isosulfurous [equivalent levels of sulfate] levels of taurine and cysteine, when used in a sulfate-free diet first limiting in cysteine. The chicks that received either K_2SO_4 or cysteine showed greater gains than did those receiving the basal diet; chicks receiving taurine showed no enhanced performance. The weight gains in response to sulfur sources was due entirely to increased food intake. [8 tables, 23 references] FTP

0.6 BATTER STARCH
(2.8)

Fruin, James C. (Anheuser-Busch, Inc.) (pat.)
U.S. Patent 3,767,826 (Oct. 23, 1973)
Chemical Abstracts 80, No. 7, 36038j (Feb. 18, 1974)

0.7 METHIONINE SUPPLEMENT ALTERS FLAVOR, PER OF
(0.6) PINTO BEANS CANNED IN TOMATO SAUCE

Dunlap, C. J., D. G. Guadagni, J. C. Miers, and J. R. Wagner (U.S. Dept. of Agriculture, ARS, WRRL, Berkeley, Calif.)
Food Product Development 8, No. 1, 88-92 (Feb. 1974)

Methionine supplementation improves the nutritive value of cooked pinto beans; however, it also introduces flavor problems in the processed product. In the present study, the taste panel preferred canned pinto beans in tomato sauce without added methionine to those with added methionine. However, when single samples were presented, the taste panel rated both products between "like slightly" and "like moderately" (on the average). Results of other work indicate that some of the volatile sulfur compounds from methionine degradation include some compounds (methional, methyl mercaptan, and dimethyl sulfide) that are strongly odorous and could cause off-flavors in supplemented products.
[2 figures, 5 tables, 8 references] FTP

0.6 COLORING HAM, SAUSAGE, JELLIED FISH OR MEAT PRODUCTS
AND OTHER PROTEIN FOODS

Umeda, Takashi, and Tadahiro Iwakuni (Sanei Chemical Industries, Ltd.) (pat.)
Japan. 73 10,546 (Apr. 4, 1973)
Chemical Abstracts 80, No. 7, 36027e (Feb. 18, 1974)

0.7 BALANCED LOW-CALORIE VS. LOW-PROTEIN-LOW-CARBOHYDRATE
REDUCING DIETS. II. BIOCHEMICAL CHANGES

Worthington, Bonnie S., and Lynda E. Taylor (School of Home Economics, University of Washington, Seattle, WA 98105)
Journal of the American Dietetic Association 64, No. 1, 52-55 (Jan. 1974)

Eleven obese women were maintained on a high-protein-low-carbohydrate (H-P-L-C) diet, and 10 were maintained on a balanced low-calorie (BL-C) diet for 14 days. Blood urea nitrogen, serum uric acid, glucose tolerance, and urinary ketones were determined and comparisons were made of these values obtained for the obese women on the two dietary regimes. The changes in blood urea nitrogen, serum uric acid, and blood sugar (2-h postprandial) were not significant; also, differences in these values between the two test groups were not significant. The frequency of occurrence and levels of urinary ketones in the women on the H-P-L-C diet increased. The ketosis was probably due to the low-carbohydrate intake, and it did not appear to depress hunger or appetite. It is yet unknown whether prolonged ketosis produces detrimental structural and functional changes in the obese adult.
[3 figures, 2 tables, 22 references] FTP

0.6 MASHED FROZEN FISH MEAT

Shimizu, Hiroshi, Takeo Shimomura, and Toshio Matsuda (Ueno Pharmaceutical Applied Research Laboratory) (pat.)
Japan. 73 18,468 (June 6, 1973)
Chemical Abstracts 80, No. 7, 36033d (Feb. 18, 1974)

0.7 BIOAVAILABILITY OF IRON SOURCES

Waddell, James (American Institute of Nutrition, Washington, D.C.)
Food Product Development 8, No. 1, 80, 82, 84, 86 (Feb. 1974)

In an earlier article in this series, R. J. Amen [Product Development 7, No.8, 74-84 (1973)] discussed trace minerals as nutrients. A more detailed review of the bioavailability of iron sources and their utilization in food enrichment was prepared by the present author [Life Sciences Research Office, F.A.S.E.B., Bethesda, Md., Publication No. PB-224122. Obtainable from the National Technical Information Service, USDC, Springfield, VA 22151. $3.75]

The total amount of iron in the body of a normal adult male is between 3 and 4 g, distributed about as follows: red-blood cell hemoglobin, 65% to 75%; ferritin and hemosiderin (storage forms of iron), 25%; muscle myoglobin, 3% to 5%. The rest is in the transferrin of the blood plasma and in several iron-containing enzymes active in cellular oxidations. In iron deficiency, the stores are depleted first. Eventually, lack of available iron interferes with hemoglobin production and the blood will contain a lower amount of iron.

In iron metabolism there is no specific iron-containing excretory compound by which the body can regulate iron balance. Iron absorbed in the body is conserved by recycling; the main control of iron balance is in the cells of the intestinal mucosa. The cells respond to changes in iron stores or intensity of red cell production by absorbing more or less of the iron in the digestive tract. In the healthy adult male, iron losses per day are about 1 mg. In the case of the

1.012 THE MEXICAN MARINE SPORT FISHERIES

Solórzano, Aurelio (Instituto Nacional de Pesca, Avenida Cuauhtemoc 80, Mexico 7, D.F., Mexico). Translated by Maxwell B. Eldridge, National Marine Fisheries Service, NOAA, Tiburon, CA 94920)
Marine Fisheries Review 36, No. 2, 19-22 (Feb. 1974)

The Mexican sport fisheries are varied and complex. Studies are needed concerning their economic, social, and cultural aspects. To investigate these aspects and to provide mechanisms for promoting sport fisheries, the Office of the Undersecretariat of Fisheries was established. An Office of Sport Fisheries was organized by the Undersecretary to obtain statistics from all activities involved with sport fishing: clubs, charter boats, and others. The National Institute of Fisheries provides for biological studies involving seasonal occurrence, ecology, and life history of sport fishes. These Government agencies are also engaged in economic and legislative aspects to aid in planning and protecting the industry and the species.

The marine sport fishes of the east and west coasts of Mexico include sailfish, striped marlin, black marlin, and swordfish. Off Mexico, sailfish are found on both sides of the peninsula of Baja California and southward to the Guatemalan border; the coast off Manzanillo is considered to be the center of abundance from May to October. Sailfish are also found on the east coast of Mexico in the Caribbean Sea and the Gulf of Mexico. Fishing for striped marlin is especially good at Cabo San Lucas on the tip of the peninsula from December to June; black marlin are fished in the same waters. Swordfish range in Mexican waters on the west

1.0118 ICE FISHING
(1.92)

Downs, Warren
WIS-SG-73-115, University of Wisconsin Sea Grant College Program, 1225 W. Dayton St., Madison, WI 53706 (Dec. 1973), 24 pp.

During a recent season, ice fishermen in Wisconsin accounted for 13% of the state's year-round fishing activity; this yielded about 21% of the annual catch. Hooking and landing fish on the ice is also exciting. For the newcomer to ice fishing, this booklet provides basic information required to take up the sport safely and inexpensively. A summary of ice fishing regulations of the State of Wisconsin is given. Examples of the regulations include prohibiting night fishing, cutting square holes, and cutting holes larger than 12 inches in diameter. Suggestions for keeping dry and comfortable are covered. A section on gear and gadgets shows the kinds of tools necessary for cutting holes in the ice; the lines, leaders, and hooks for catching game fish; and the gear necessary to catch panfish. In this section, the shelters, sleds, pails for bait, and other conveniences are also described. Most of the fish caught are panfish; the most abundant of these are bluegill and yellow perch. The author advises on the feeding habits, the depths to fish, the gear, and the bait necessary to catch panfish. The game fish are active in the winter; these include northern pike and walleye pike. The cotton lines for catching these fish should be at least 10-lb test, and the leaders should be about 15-lb test. The bait to use and the feeding habits of these fish are also described. In addition, highlights of hooking and working these fish back to the

1.0142 FAROE ISLANDS -- FISH EXPORTER TO THE WORLD

Glen, David (110 Fleet Street, London EC4A 2JL, England)
Fishing News International 13, No. 1, 22-24, 27-28, 30-31, 33-36, 39 (Jan. 1974)

The Faroe Islands are an autonomous part of the Kingdom of Denmark. There are 18 islands in the group which lies in the North Atlantic roughly between the northern tip of Scotland and Iceland. The islands support a population of 40,000 people. The sole major commodity is fish, the basis for important trade links between European and American countries. Before fishing occupied the Faroese about a century ago, agriculture was the main enterprise. Starting in 1872, the fishing industry grew from a few small boats to a larger fleet that has become a world supplier of fish. The early products were dried and wet salted cod; in modern times the products are frozen fillets, processed herring, and fish meal. The markets for salted and dried fish have gradually disappeared. In 1973, 16 fillet factories and 7 herring plants produced 177 varieties of frozen food packs, 14 herring products, and 44 kinds of salted fish. The fishing industry is the largest employer on the islands. The full time and part time total was 4,150 fishermen in 1972. The factories employ 800 to 1,000 men and women depending on the season. All registered fishermen receive a guaranteed daily wage and a percentage catch bonus. Of the 206 fishing vessels of all types over 20 gross tons, about 50% were built after 1958. The largest class of vessels in the fleet is the long liners. The number of purse seiners is increasing, and are most useful in the August-April herring seasons around the home islands. They also bring in industrial species (or trash fish) to take the place of herring in the meal plants. Trawlers

1.0118 (1.92)

hole in the ice is included. A section on safety gives information on keeping warm with face masks, goggles, and hot soup. Alcoholic beverages cause the body to lose heat. Venturing out on a large lake requires an aid, such as a compass, to make the return trip safely. To stay on top of the ice, the fisherman should make sure the ice is at least 4 in thick; he may cut a few holes to make sure. Also he should take the pathways in the snow rather than start a new path. Clothing is buoyant and keeps up anyone who has fallen through the ice. The fisherman who has fallen through needs a sharp implement handy to claw his way back on the ice surface. Those who drive out on the ice should not follow each other too closely to ensure that the weight of the cars will be better distrubuted. When driving on ice the fisherman is advised not to fasten the seat belt, keep the window down, and the door ajar. If the car breaks through, the fisherman should shift to neutral, sprawl out of the car, and quickly roll away from it. In spite of these possibilities, ice fishing continues to increase in popularity. SW

1.0142

also bring in trash fish. Meal production has increased in land plants and from stern fishing cutters equipped with reduction plants. Cod and herring catches have declined through 1972; however, the herring catch improved in 1973. Improvements such as new filleting plants, a new quay, and boat building are continually adding to the capability of the fish industry. The author visited private plants located on different islands and described their operations.
[34 figures, 3 tables] SW

0.8 (2.113) CORROSION BEHAVIOR OF ALUMINUM-COBALT BRONZES IN A MARINE ENVIRONMENT

Fortina, G., and M. Leoni (Inst. Sper. Met. Leggeri, Novara, Italy)
Chemical Abstracts 80, No. 4, 18431c (Jan. 28, 1974)

0.7

female the amount may be as high as 1.8 mg. The recommended daily allowances, thus, fall between 1.0 and 1.8 mg per day. However, because the absorption of iron by all population categories is around 10%, the allowances, except for the newborn, fall between 10 and 18 mg of iron.

Soluble iron salts of the ferrous valence (Fe^{++}) lead to greater absorption than those of the ferric valence (Fe^{+++}). Furthermore, some foods are better sources of absorbable iron than others. Iron in food of animal origin is absorbed to a greater extent than iron from foods of plant origin. Much of the iron in meat-derived and fish foods is present as the iron-porphyrin complex (heme) which is the form in which iron is bound and functions in the protein molecules of hemoglobin, myoglobin, and some of the cellular enzymes. The heme moiety holds the iron firmly during the early stages of digestion but is absorbed as such by the cells of the intestinal mucosa. Apparently, plant foods do not have measurable amounts of heme iron.

The author cautions that knowing the iron content of a food, or a mixture of foods, is not a precise measure of its value as a source of absorbable iron. He believes, too, that the popular assumption that 10% of the total iron in the average U.S. diet is likely to be absorbed must be regarded as an "educated guess" rather than a fully established value.
[1 figure, 1 table, 11 references] FTP

1.012

coast from the Gulf of California southward. Other sport species abundant in Mexican waters are tarpon, tuna (Thunnus species), skipjack tuna, bonito, mackerels, barracuda, wahoo, bonefish (Albula vulpes), dolphin, roosterfish (Nematistius pectoralis), totuava (Cyonoscion macdonaldi), jacks, snappers, snook, yellowtail, and black sea bass. Various formidable species of shark are numerous: tiger shark, great white shark, great hammerhead shark, and shortfin mako shark. Some of these sharks may grow to 15 to 20 ft.

There are two categories of marine sport fisheries: the commercial sport fishery, using charter or "party" boats; and fishing from private boats and from the shore. Of 200,623 sport fishing permits issued in 1971, most were for party boat fishermen, and 56% of the permits were issued in San Diego and San Pedro, Calif. Most trips to the sport fishing areas last from 1 to 8 days. Of the 89,026 permits issued within Mexico in 1971 about 62% were from the states of Baja California, Sonora, and the territory of Baja California Sur. Acapulco accounted for 24%.

The growing sport fisheries will provide employment opportunities for Mexico's rising population. Information to travel agencies on distribution and abundance of species and availability of facilities will help to develop the sport fisheries.
[5 figures] SW

1.87 (1.0162) (9.11)

A MASS STRANDING OF ROCK LOBSTERS JASUS LALANDII (H. MILNE EDWARDS, 1837) AT ELANDS BAY, SOUTH AFRICA (DECAPODA, PALINURIDEA)

Newman, G. G., and D. E. Pollock (Div. of Sea Fisheries, Cape Town, South Africa)
Crustaceana 26, Part 1, 1-6 (Jan. 1974)

The rock lobster is fished commercially on the west coast of southern Africa; hoop nets and baited traps are used in depths between 5 and 80 meters. The annual catch from a short coastline of about 4 km at Elands Bay is about 500,000 rock lobster.

In an earlier report, the authors described the inshore movement of rock lobsters at Elands Bay during the period June 1968 to July 1969. Inshore massing of lobsters occurred regularly in summer. This observation was confirmed by fishermen who work within a few hundred meters from the coast during the (antipodal) summer months. The earlier report also indicated that oxygen-poor water lay within 15 km offshore much of the year; however, in summer, when southerly winds regularly blow, upwelling and calm seas caused the oxygen-poor water to move very close to the shore.

In early March 1968, a mass stranding of the lobsters occurred at low tide in Elands Bay. Observers reported that a stretch of the intertidal zone about 120 m long was covered by thousands of lobsters. The authors surmised that the lobsters were alive when stranded, but exposure to the sun caused a large mortality which was reflected in the lower catch per unit effort the following season. Divers examined the distribution of the lobsters below the intertidal zone; the lobsters

2.00

NORMAL POSTMORTEM CHANGES IN THE BROWN SHRIMP, PENAEUS AZTECUS

Lightner, Donald V. (Gulf Coastal Fisheries Center, Galveston Laboratory, National Marine Fisheries Service, NOAA, Galveston, TX 77550)
Fishery Bulletin 72, No. 1, 223-236 (Jan. 1974)

Shrimp from the Gulf of Mexico are one of the most valuable fishery products in the United States. Nevertheless, little is known about their histology and the rates and patterns of postmortem changes. Some of the factors that influence the rate of autolysis in a dead animal are water temperature, dissolved oxygen level, pH, bacterial flora of the water and of the animal, and the physiological condition of the animal at the time of death. Postmortem changes in animals occur in a regular and irreversible pattern and at a relatively constant rate from one individual to another when factors causing variation in the rate and pattern are considered. Differentiation of histological changes due to disease from those due to postmortem autolysis or poor fixation is possible once the normal rates and patterns of postmortem changes under various conditions are known.

The present study was undertaken to determine the normal rates and patterns of postmortem change in penaeid shrimp as an aid in distinguishing gross and histoligic changes due to autolysis from changes due to disease. Experimental shrimp were held at 10°, 20°, or 30° C in water-saturated air or in seawater at a salinity of 30 ‰. Observations were made at 0, 2, 4, 8, 12, 24, 48, and 72 h postmortem.

The first change observed grossly was the onset of a rigorlike stiffening of the abdominal musculature. This stiffening was noted at 2 h postmortem at 30° C,

1.953 (9.1)

AGE DETERMINATION, AGE DISTRIBUTION AND GROWTH OF BOTTLENOSE WHALES, HYPEROODON AMPULLATUS (FORSTER), IN THE LABRADOR SEA

Christensen, Ivar (Institute of Marine Research, P.O. Box 2906, N-5011 Bergen-Nordnes, Norway)
Norwegian Journal of Zoology 21, No. 4, 331-340 (Dec. 1973)

The layered structure of the teeth of some vertebrates was reported by early researchers including D. F. Eschricht [K. Danski Vidensk. Selsk. Naturvid. Mat. Afh. 11, 321-378 (1845)] who demonstrated layers in the teeth of the bottlenose whale. Layers in the teeth were not used for determining age until methods were developed by R. M. Laws [Z. Säugetierk. 27, No. 3, 129-146 (1962)] for seals. Other reports indicate that a definite number of layers is deposited in the dentine or cementum of the teeth, and all toothed whales form one growth layer per year in the dentine with accesory bands distinct in some species.

Data were gathered on 129 bottlenose whales caught off Labrador by whaling ships in May-June 1971. The group of whales consisted of 76 males and 53 females; the jaws and other organs were collected for further study. Large variations in the thickness of the individual growth layers within a tooth were observed, and the author suggests that there is a clear trend in dentine accumulation with age. Other workers reported that the first, and all subsequent ovulations, can be recognized in the ovaries of the female whales; this was seen in bodies that persist in the ovary and are due to the resorption of old corpora lutea after each ovulation. Another report of a 12-month gestation period, and the 1:1 ratio of preg-

2.00 (7.8)(8.8)

[STUDIES ON GREENING OF CANNED SHELLFISHES]

Osada, H. (Toyo Inst. of Food Tech., Kawanishi-shi, Hyogo, Japan) [Parts II, III, IV, V, VI, VII, and VIII. Osada, H., and O. Shigeru (Part IX)]
Report of the Toyo Junior College of Food Technology and Toyo Institute of Food Technology 10, 90-142 (1972) [In Japanese]
Food Science and Technology Abstracts 5, No. 12, 149-150, Abstract Nos. 12R610 to 12R617 (Dec. 1973)

[II. Isolation of Green Pigments of Canned Oysters and Their Physico-Chemical Properties], pp. 90-95. Five copper-containing components of the green pigments of canned oysters were similar to Cu-phaeophytin a or Cu-phaeophorbide a; they were not chlorophyll a nor Cu-chlorophyll a. [1 reference]

[III. Comparison Between the Physico-Chemical Properties of the Green Pigments of Canned and Raw Oysters], pp. 96-102. The five components of the green pigments of canned oysters were also found in raw oysters. [4 references]

[IV. Comparison Between the Physico-Chemical Properties of the Green Pigments of Aosa (Ulva conglobata) and Those of Canned Oysters], pp. 103-110. The pigments from aosa (green alga) were chlorophyl a derivatives, and they were similar to the pigments in canned oysters.

[V. Seasonal Variation in the Content of Green Pigments in Oysters and the Relation Between the Content of Green Pigments and That of Metals], pp. 111-116. The level of green pigments in oysters varies considerably with the location (area of harvest) and season. The metal content (Fe, Mg, Zn, and Cu) of the oysters

1.953 (9.1)

nant to lactating females indicated that the bottlenose whales have a 2-year breeding cycle. By relating the reproductive history of mature females to the number of dentine growth layers in the teeth of each animal, the author concludes that one dentine growth layer is deposited per year.
The life span of the bottlenose whale is about 37 years. After a length at birth presumed to be 300 mm, there is rapid growth during the first 2 to 3 years. Growth stops at about 20 years. The length at maturity is 850-900 cm for males, and 730-570 cm for females.
[9 figures, 23 references]

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This fishhook is for holding live fish for bait in line fishing.

1.87 (1.0162)(9.11)

were densely packed along an area of rocky bottom about 400 m long [parallel to the shore] and extending about 100 m offshore. All the lobsters below the intertidal zone were lively and no dead lobsters were seen. Prior to the stranding, strong southerly and southeasterly winds blew continuously for 2 weeks. These conditions would favor the inshore movement of oxygen-poor water along the bottom and cause the lobsters to congregate in the shallow water. Just before the stranding on March 2, the wind dropped, and the sea became unusually calm. The calm seas, the gently sloping bottom, and the spring tide conditions enabled the lobsters to move into the intertidal area. Such a shoreward movement of the lobsters would not have occurred if wave action were present rather than a dead calm. Wave action normally produces surges which force the lobsters to seek shelter. Further north in the lee of Cape Deseado, also inhabited by rock lobster, slight wave action occurred in spite of the unusual calm conditions. The wave action was sufficient to keep strandings to a minimum. Of the samples of stranded lobster collected, most were females.
[1 figure, 1 table, 2 references]

SW

2.00 (7.8)(8.8)

varied considerably with location but not with the season. There was no correlation between the levels of the metals and of the green pigments in the oysters.
[6 references]
[VI. The Green Pigments of Canned Short-Necked Clams and the Boiled Entrails of Abalones], pp. 117-125. The green pigments of canned short-necked clams and the boiled entrails of abalones contained five components that appeared to be similar to the five components from the green pigments of canned oysters. They appear to be chlorophyl a derivatives and have a molecular weight of 620-900 (as determined by gel filtration). [3 references]
[VII. The Green Pigments of Canned Oysters Cultivated in Matsushima Bay], pp. 126-131. Five components were found in the green pigments of canned oysters, which had been cultivated in Matsushima Bay; these pigments were similar to those in the oysters from Hiroshima Bay. [1 reference]
[VIII. The Effect of Processing Conditions and Metals on the Greening of Canned Oysters], pp. 132-137. Oysters, hermetically sealed in cans, turned green during the cooking process (90° C for 20 min or 110° C for 10 min). The oysters in the can turned green under acid conditions and turned brown under alkaline conditions. The metals Mg, Zn, Fe, and Cu did not promote the development of the green color. [3 references]
[IX. A Method for Prediction of Greening of Canned Oysters], pp. 138-142. Data on the optical density (at 660 nm) of the HCl-acetone extracts of raw oysters are used to predict the greening of the subsequently canned oysters. [2 references]

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2.00

but disappeared by 12 h postmortem. The condition appeared later and persisted longer at the lower temperatures. Histologically, the tubule epithelium of the hepatopancreas was the first tissue to show autolytic change. The autolysis in the remaining tissues examined occurred in the following order: foregut and midgut epithelium, heart, neurons and nerve fibers, antennal gland epithelium, gill epithelium, epidermis, muscle, and lastly connective and cuticular tissue elements. In all tissues the rate of autolysis was temperature-dependent.
The relative rates and patterns of postmortem change in shrimp are similar to those for the oyster and for mammals. In mammals, oysters, and shrimp, tissues that produce large amounts of proteolytic enzymes such as the mammalian pancreas and lining epithelium of the stomach, oyster digestive tubules, and shrimp hepatopancreas and gut epithelium autolyze the most rapidly. Tissues that autolyze nearly as rapidly are high lipid containing tissues such as nerve tissue. In the shrimp and in mammals, muscle, connective, and epidermal tissues undergo the least rapid autolysis.
[8 figures, 4 tables, 9 references]
[Author's abstract and part of the text; also, some parts slightly edited]

2.00 (2.03) — JELLIED MEAT OF TUNA. III. PROTEOLYTIC ACTIVITY OF THE JELLIED MEAT OF YELLOWFIN TUNA

Konagaya, Shiro, and Keishi Amano (Tokai Reg. Fish. Res. Lab., Tokyo, Japan)
Chemical Abstracts 80, No. 7, 35930g (Feb. 18, 1974)

2.110 — LIVE BAIT FISHHOOK

Deboois, Theodore J. (42) Hyde Park Blvd., Niagara Falls, N.Y. 14305 (pat.)
U.S. Patent 3,777,413, Office 916, No. 4, 1241 (Nov. 27, 1973)
Official Gazette of the United States Patent Office

2.113 (2.111) — ANTIFOULING FIBERS FOR FISHING NETS AND ROPES

Hayashi, Yasuo, Yoshiaki Adachi, and Mitsuo Onotzuka (Kureha Chemical Industry Co., Ltd.) (pat.)
Japan. Kokai 73 51,937 (July 21, 1973)
Chemical Abstracts 80, No. 4, 16247y (Jan. 28, 1974)

2.1121 SHRIMP FISHING APPARATUS

Newman, James L. (1321 Glen Cove, Richardson, TX 75080), and Milo Marion Hawthorne (pat.)
U.S. Patent 3,777,388 (Dec. 11, 1973)

This electrical trawling system consists of an alternating current generator (carried by the fishing vessel) and a plurality of trawl nets each pulled by a tow cable from the vessel, and each trawl having an electrode array. FTP

2.1123 FISHING LINE WITH A CYCLIC SULFONIUM ZWITTERION FLUOROCARBON COATING

Schmidt, Donald L., and Hugh B. Smith (Dow Chemical Co.) (pat.)
U.S. Patent 3,748,168 (July 24, 1973)
Chemical Abstracts 80, No. 2, 4858k (Jan. 14, 1974)

2.12 (2.1473) (1.121)(1.018) STUDIES ON FISHING OF ALBACORE, THUNNUS ALALUNGA (BONNATERRE) BY EXPERIMENTAL DEEP-SEA TUNA LONG-LINE

Saito, Shoji (Faculty of Fisheries, Hokkaido University, Hakodate, Japan)
Memoirs of the Faculty of Fisheries Hokkaido University 21, No. 2, 107-185 (1973)

The author indicates that few experiments have been carried out on longline fishing for tuna below depths of 200 m. In the present study, exploratory deep-sea longline and vertical longline albacore fishing were carried out. The fishing experiments were performed each season from 1964 to 1969 west of the Fiji Islands using various longlines designed by the author. This paper describes the construction and functioning of the longlines and reports information on the hooking depth.

The swimming depth of the large-size South Pacific albacore in the daytime in November in the sea west of the Fiji Islands is between 80 m and 380 m (the depth limit of the vertical longline). The distribution of the albacore above the 140 m layer (the depth limit of the commercial longline) is light. The distribution of albacore increases gradually from 160 m to 200 m, and the fish are most dense at 200 m to 260 m. Albacore tuna concentrations decrease again from 280 m to 300 m. The author believes that deep-water fishing for albacore will be feasible in the future.
[69 figures, 43 tables, 1 plate, 75 references] FTP

2.12 (2.1478) THE "HAPS" A FRAME-SUPPORTED BOTTOM CORER

Kanneworff, Ebbe, and Willy Nicolaisen (Marine Biological Laboratory, DK-3000 Helsingör, Denmark)
Ophelia 10, No. 2, 119-129 (Oct. 1973)

Of the large number of quantitative bottom samplers, the majority can be divided into grabs and corers. The main advantages of the corers are that the volume of the sample has a well defined relation to the surface area, and the vertical stratification of the sediment is preserved. The main disadvantage is that the corer needs to be excessively heavy in order to sample a surface area comparable to that sampled by a grab sampler. However, the need for weight can be partly offset by using some kind of suction action. Additionally, a corer tends to get stuck in soft sediment.

In response to the work requirements of the authors' laboratory, a new type of corer was designed to correct the disadvantages of the earlier type corers. The name given to the corer, "haps," is a Danish exclamation when something has been grasped very quickly. The corer consists of a stainless-steel length of tubing which pierces and is welded to a quadratic plate. The quadratic plate is made of stainless steel and is called the grip. The length of tubing through the top of the grip is short and is fitted with a foam-rubber lined lid which functions as a valve. The lower rim of the tubing is sharpened to facilitate penetrating the sediment. The lid is positioned on the top of the tube by two short rods that fit into corresponding holes in the grip. The grip fits into the

2.149 (2.12) AN EVALUATION OF MID-WATER ARTIFICIAL STRUCTURES FOR ATTRACTING COASTAL PELAGIC FISHES

Wickham, Donald A., and Gary M. Russell (Southeast Fisheries Center, National Marine Fisheries Service, NOAA, Pascagoula, MS 39567)
Fishery Bulletin 72, No. 1, 181-191 (Jan. 1974)

Artificial structures are effective for attracting concentrations of pelagic fishes. Earlier workers visually evaluated the species and number of coastal pelagic fishes attracted to experimental artificial structures in the northeastern Gulf of Mexico. Studies were conducted during August 1970, in 5 to 10 fathoms (9 to 18 m) of water offshore of Shell Island, Panama City, Fla., to obtain quantitative samples for evaluating the validity of scuba-diver estimates of structure-attracted fish aggregations, to evaluate methods for using a conventional purse seine for capturing structure-attracted fish, and to obtain catch-production values for single structures. We also evaluated effects of structure soak time and size-color differences on attraction effectiveness. Day and night samples, plus scuba-diver observations of fish behavior, provided additional clues to the dynamics of the coastal pelagic fish aggregations attracted to artificial structures.

Mid-water artificial structures positioned off Panama City, Fla., during August 1970 were evaluated to determine their ability to attract coastal pelagic fishes. Quantitative and qualitative experimental results were obtained using scuba divers and purse seine catches. The feasibility of using artificial structures to facilitate the commercial harvest of coastal pelagic fishes with purse seines was established and the methods described. Average catch values of 398 kg

2.12 (2.1478)

carrier and is secured with a lock; two screws on the carrier hold eight weights totaling about 50 kg. The corer assembly is supported by a weighted four sided, pyramidal, tubular frame. The corer tube has an inner diameter of 13.6 cm and is 27 cm long. The grip plate is 17.5 × 17.5 cm and 1.2 cm thick. The frame is made of iron tubing with a diameter of 2.7 cm; the base measures 80 cm square. From the four corners of the base, the four tubes, 95 cm in length, extend upward to a guide plate measuring 15 × 15 × 1 cm. All iron parts except for the corer tube are electroplated.

The area sampled by the corer is about 150 cm^2, and the core depth is 25 cm in mixed and soft sediment. In hard sand the core depth is about 10 cm. The corer can be operated from a motorboat provided with a power winch. In test operations of the corer, the animals found in the core sample seemed to be completely undisturbed by the action of the corer.
[6 figures, 2 references]

MS

2.113 SEA WATER RESISTANCE TREATMENT OF ALUMINUM AND FERROUS ALLOYS WITH VINYLIDENE FLUORIDE RESIN COATING

Watanabe, Yukiyasu, and Hiroshi Murata (Furukawa Electric Co., Ltd.) (pat.)
Japan. Kokai 72 29,430 (Nov. 6, 1972)
Chemical Abstracts 80, No. 6, 28546h (Feb. 11, 1974)

2.1128 CRUSTACEAN TRAP

Gardina, Jerome J. (10 Sheridan St., Brocton, MA 02402) (pat.)
U.S. Patent 3,772,818 (Nov. 20, 1973)

This crustacean trap has a stable base member supporting several serviceable compartmented sections. It was designed to allow easy removal of the crustaceans and to prevent unauthorized harvesting.

FTP

2.3 [SCUMBRIA SPLITTING MACHINE]

Barabash, A. I., and F. V. Sakne (Dal'giprorybprom, U.S.S.R.)
Rybnoe Khozyaistvo, No. 3, 66-68 (1973) [In Russian]
Food Science and Technology Abstracts 5, No. 12, 144 Abstract No. 12R586 (Dec. 1973)

Details of the construction and action of a machine for dressing and cleaning scumbria are given.

FTP

2.149 (2.12)

(875 lb) per structure were obtained during a period when coastal pelagic fishes were unavailable to the local fishery. A greater total production was obtained from structures fished daily compared with those allowed to soak for 3 days before being fished. Experimental purse seine collections established that fish leave the structures at night with new recruitment occurring daily. No significant differences were obtained from preliminary experiments to evaluate the effects of structure size and color on attraction effectiveness. A working hypothesis is presented to describe apparent behavioral mechanisms involved in the attraction of some species of coastal pelagic schooling fish to objects in the sea. This study indicates that artificial-structure fish-attraction has potential for development as a technique to facilitate the harvest of the latent coastal pelagic fishery resources in the Gulf of Mexico.

Our experience during this study indicates that artificial-structure fish attraction techniques can be developed to facilitate the harvest of the latent coastal pelagic resources in the Gulf of Mexico. Artificial-structure fish attraction techniques may also have sport fishing applications, potential for development as a method for providing ground truth for fishery survey remote sensor evaluation and as a method for monitoring fish movements and relative changes in abundance in certain geographical areas. These potential applications for artificial-structure fish attraction techniques will be the subject of future investigations. [7 figures, 2 tables, 6 references]
[Authors' abstract and part of text; also parts slightly edited]

2.15 (2.4) EFFECT OF DRAINING METHOD ON THE QUALITY OF FISH STORED IN BOXES

Peters, John A., Allan F. Bezanson, and John H. Green (National Marine Fisheries Service, NOAA, Gloucester, MA 01930)
Marine Fisheries Review 36, No. 2, 33-35 (Feb. 1974)

Bulk stowage in pens causes loss of quality in fish through crushing and bruising. Previous reports indicate that boxing, rather than stowing in bulk, extended the storage life of fish by 1½ to 3 days and caused a weight gain of about 5%. An important requirement of the boxes is that when they are stacked the water from the melting ice drains off without passing through the lower layers of boxes. This feature makes them more expensive than simple boxes. With this design, contamination of the fish, in the lower tiers of boxes, with bacteria laden meltwater is prevented. An investigation was performed to determine whether the meltwater hastens the spoilage of iced fish stored in the lower tier boxes. The trials were conducted with iced haddock stored in stacks of plastic toteboxes. The fish in the lower tier boxes were then subjected to taste panel and microbiological tests. The results indicate that there was no difference in quality between fish from the upper and lower tiers of boxes. This information makes the use of less expensive plastic nest-and-stack toteboxes feasible in storing iced fish. Other types of commonly used boxes for shipping poultry and produce could also be used for boxing iced fish. The authors suggest that the test results also justify the adoption of this technique by vessel owners who have hesitated because of the costs involved in purchasing boxes of the more expensive design.
[3 figures, 2 tables, 1 references]

SW

2.3 APPARATUS FOR PROCESSING FOODSTUFFS
(3.4,

Seelbach, Bernard H.; assignor to K. C. Seelbach Co., Inc., Rhinebeck, N.Y. (pat.)
U.S. Patent 3,747,513
Official Gazette of the United States Patent Office 912, No. 4, 1343 (July 24, 1973)

This invention concerns a method for smoking and processing foodstuffs. The equipment has a housing consisting of three chambers, one above and enveloping the other. The lower chamber is the processing chamber, the upper chamber is the air and/or smoke distribution chamber, and the intermediate chamber is a plenum chamber.
FTP

3.234 [HIGH-SPEED, ASEPTIC TREATMENT FOR COMMERCIAL PREPARATION OF BIOLOGICALLY STABILIZED PRAWNS]

Mennillo, J. J. (pat.)
French Patent Application 2,142,881 (1973) [In French]
Food Science and Technology Abstracts 5, No. 12, 148, Abstract No. 12R609 (Dec. 1973)

Blocks of frozen prawns are thawed under saturated steam in an autoclave. The thawed prawns are flash-pasteurized at 95° C then immersed for 30-60 sec in a boiling bath of the exudate from the thawing operation. The pasteurized prawns are frozen in liquid nitrogen. The pasteurized, frozen prawns are then dipped for a few seconds into a bath containing 0-2% of a C_6 sugar, 8-12% salt, 1% citric acid, and 0.5% ascorbic acid.
FTP

2.9 EFFECT OF TUNA FISH AND SELENIUM ON THE TOXICITY
(0.35) OF METHYLMERCURY: A PROGRESS REPORT

Ganther, H. E. (Dept. of Nutritional Sciences, University of Wisconsin, Madison, WI 53706), and M. L. Sunde
Journal of Food Science 39, No. 1, 1-5 (Jan.-Feb. 1974)

Fish are able to take up and absorb in their muscle and other tissues mercury (in the form of methylmercury CH_3Hg^+) from their food supply and from the water. Certain marine food fish (especially tuna and swordfish) tend to accumulate Hg. It appears that Hg levels in the oceans have been relatively constant for many years and, thus, man has long consumed tuna containing elevated levels of mercury. Two questions arise: (1) How toxic are low concentrations of Hg when ingested in diets containing tuna (with accumulated mercury)? and (2) Are there factors in tuna that modify the toxicity of Hg? This paper is a progress report of a long-term study of the biological effects of low levels of mercury (when ingested as Hg-containing tuna) on Japanese quail. This particular bird was selected for the tests because it eats large amounts of food in relation to its size, it tolerates high levels of tuna in its diet, and it reproduces subsequent generations in a short period. The experimental design called for a five-generation study of the effects of mercury on the general appearance, growth, survival, and reproduction of Japanese quail. Analyses were also made of the mercury levels in the tissues of the birds. The final report will be published in detail when completed. Two basic diets were used: tuna (canned) and corn-soy. Various mercury levels from 0 to 20 p/m were used; the higher levels were achieved by adding methylmercury

3.249 A MULTIPLE SAMPLING TECHNIQUE FOR USE WITH THE
(7.8) CELL-FRAGILITY METHOD OF DETERMINING DETERIORATIVE CHANGES IN FROZEN FISH

Whittle, Kevin J. (Torry Research Station, 135 Abbey Rd., Aberdeen AB9 8DG, Scotland)
Journal of the Science of Food and Agriculture 24, No. 11, 1383-1389 (Nov. 1973)

The modified cell-fragility method to which the sampling technique reported in this paper applies was described earlier [R. M. Love and M. Muslemuddin, J. Sci. Fd. Agric. 23, 1239 (1972)]. In order to establish the quality of a batch of fish by the cell-fragility method, a large number of replicate determinations have to be carried out. These replicate analyses are time consuming. This paper contains a description of a simple sampling technique for the cell-fragility method that permits an almost tenfold increase in the number of determinations in an hour.

In the earlier method, samples of 100±5 mg of connective tissue-free fish muscle are required for each determination. The multiple sampling method described in this paper produced a coherent 100-mg sample of standard shape composed of 10-mg pieces each of which was taken from a myotome [slice] of a different fish. A double bladed knife with an aluminum handle and a boring sampling tool are used to prepare a slice of muscle and to cut sample disks from the slices. The composite or multiple samples are suitable for use in the conventional cell-fragility test; a weighing step serves only to check on the reproducibility of the samplings, and proficiency in the sampling technique is readily acquired. By this technique, 25 composite samples (representing 250 fish) can be handled per hour.
[1 figure, 3 tables, 7 references]
FTP

2.9 (0.35)

hydroxide. Lyophilized canned tuna (2% moisture content) was used at a level of 17% in the diet. The mercury levels in the diets were at 0, 0.05, 0.25, 0.5, 1, 10, and 20 p/m depending upon the test. Selenium (as sodium selenite) was added at levels 0, 0.35, 0.7, 1.50, 3.00, and 6.00 p/m to the various diets to determine any protective effect of selenium on mercury toxicity.

The significant result was that the toxicity of methylmercury added to the diets of Japanese quail was less for the birds fed tuna than for the birds fed a corn-soy diet. The evidence seems to indicate that selenium is probably the factor in tuna that reduces mercury toxicity. The results further indicate that the chronic toxicity of methylmercury (the environmentally significant form of mercury) can be considerably decreased by feeding sodium selenite in the diet at levels comparable to the nutritional requirement for selenium.
[8 tables, 29 references]

FTP

3.249 LIPID CHANGES IN FISH MEAT DURING COLD STORAGE. I. CHANGES IN THE LIPIDS OF ORDINARY AND DARK MUSCLES OF MACKEREL

Morii, Hideaki, and Ryoichi Kanazu (Nagasaki Univ., Nagasaki, Japan)
Chemical Abstracts 80, No. 7, 35935n (Feb. 18, 1974)

3.249 QUALITY CHANGES OF FROZEN FISH AFTER LONG-TERM STORAGE

Danilov, M., V. Shevchenko, and L. Dubskaya ("F. Engels" Leningrad Inst. Soviet Trade, Leningrad, U.S.S.R.)
Chemical Abstracts 79, No. 21, 124821u (Nov. 26, 1973)

3.11 PRESERVING FISHERY AND ANIMAL MEAT PRODUCTS

Ueno, Ryuzo, Tetsuya Miyazaki, Tatsuo Kanayama, and Toshio Matsuda (Ueno Pharmaceutical Applied Research Laboratory) (pat.)
Japan. 73 17,065 (May 26, 1973)
Chemical Abstracts 80, No. 1, 2427v (Jan. 7, 1974)

3.238 PRINCIPLES OF FOOD PACKAGING. AN INTERNATIONAL GUIDE
(3.38)(3.336)

Heiss, R. (editor)
Published by arrangement with the Food and Agriculture Organization of the United Nations, Via delle Terme di Caracalla, Rome, Italy (1970), 332 pp.

The following topics are covered in this book. (1) Packaging terminology; (2) Packaging requirements of foodstuffs and the influence of packaging on shelf-life; (3) Flexible packaging: paper, films, metal foils, adhesives, and heat-sealing methods; (4) Packaging and equipment: cartons, boxes, cans, glass jars, plastic containers, leakproof bags, preformed bags, and machine forming, filling, and closing; (5) Shipping materials: multiwall sacks, jute and woven plastic sacks, fiberboard containers, and metal drums; (6) Food packaging in the tropics; and (7) Test methods and specifications for packaging. There are many illustrations in the book and a list of the contributors and their affiliations is given.

SW

3.12 AGENTS FOR CONTROLLING MICROORGANISMS

Ueno, Saburo, Osamu Ohtake, Yoshio Suzuki, and Masanori Ikuzawa (Kureha Chemical Industry Co., Ltd.) (pat.)
Japan. Kokai 72 43,233 (Dec. 19, 1973)
Chemical Abstracts 80, No. 7, 36031b (Feb. 18, 1974)

3.11 PRESERVING JELLED MEAT PRODUCT

Ueno, Ryuzo, Tetsuya Miyazaki, and Nario Inamine (Ueno Pharmaceutical Applied Research Laboratory) (pat.)
Japan. 73 17,064 (May 26, 1973)
Chemical Abstracts 80, No. 1, 2433u (Jan. 7, 1974)

3.25 THE CARRIAGE OF REFRIGERATED CARGOES
(9.6)(2.118)

Anonymous
Published by International Institute of Refrigeration, 177 Boulevard Malesherbes, 75017 Paris, France (1973), 138 pp. (In French and English) Francs 30

This manual provides general data on shipboard refrigeration plants, refrigeration requirements, and refrigeration conditions applicable to different foodstuffs. One chapter covers horticulture products, nursery stocks, fruits, and vegetables. Other chapters are devoted to meat, fish, frozen foods, and ship's stores. A table on cargo compatibility is included. The manual is primarily intended for the guidance of the sea-going engineer and those who are responsible for maintaining, in good condition, either chilled or frozen cargoes. SW

3.5 RAPID TECHNIQUES FOR SALT-CURING FISH: A REVIEW

Mendelsohn, Joseph M. (National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Emerson Ave., Gloucester, MA 01930)
Journal of Food Science 39, No. 1, 125-127 (Jan.-Feb. 1974)

The authors briefly review various methods of rapid salt-curing of fish and discuss the advantages and disadvantages of each. The methods discussed were (1) boiled salted fish (pindang), (2) bagged salted fish (British method), (3) dehydration-injection salted fish (the fish are subjected to freeze-drying and then at a specified point, while under a vacuum, the fish are impregnated with a saturated brine), (4) salt propulsion method (salt crystals are projected into the fish fillets), (5) Del Valle/Nickerson method (the fish and salt are ground together, the mixture is pressed to remove excess moisture, and the press cake is dried), and (6) Anderson/Mendelsohn method (the fish muscle and a saturated salt solution are ground in a blender, free liquid is drained off, and the wet salted fish is vacuum drum dried). The choice of method is governed by the product desired, the equipment available, and the time available for preparing the product. [17 references] FTP

3.63 AN ANALYSIS OF ATMOSPHERIC FREEZE DRYING

Heldman, D. R. (Agricultural Engineering Dept. and Dept. of Food Science & Human Nutrition, Michigan State University, East Lansing, MI 48823), and G. A. Hohner
Journal of Food Science 39, No. 1, 147-155 (Jan.-Feb. 1974)

Atmospheric freeze drying involves the use of cold gas with low water vapor pressure to cause sublimation of moisture from a frozen food at or near atmospheric pressure. Because the rate of atmospheric freeze drying is slow, it has been assumed to be economically unfeasible. In atmospheric freeze drying the rate controlling parameter is molecular diffusion of water vapor within the dry product structure; vacuum freeze drying is generally heat transfer limited. Atmospheric freeze-drying equipment potentially offers the advantage of low initial cost as compared to conventional freeze drying which requires expensive vacuum associated components. By use of a continuous system design, the atmospheric freezing drying process might produce a higher quality food by eliminating the harmful effect of excessive temperature in the semidry portion of the food product.

The authors derived a mathematical model simulating atmospheric freeze drying that allows for evaluation of appropriate heat and mass transfer parameters by nonlinear estimation. According to the authors, the model is a numerical solution of appropriate differential equations for heat and vapor transport in the semidry, porous product layer which develops as the product dries. Experimental measurement of moisture content during atmospheric drying of beef was used to verify the model. The results indicated that the rate of atmospheric freeze drying is mass transfer limited and heat transfer is by conduction through the matrix of product

4.13 (1.53) THE FATTY ACID COMPOSITION OF THE LIPIDS FROM TWO SPECIES OF HAKE

Wessels, Jacobus P. H., and Andrew A. Spark (Fishing Industry Research Institute, University of Cape Town Rondebosch, Cape Province, Republic of South Africa)
Journal of the Science of Food and Agriculture 24, No. 11, 1359-1370 (Nov. 1973)

The effects of species, sex, condition, and physiological state on the fatty acid composition of the lipids of two species of hake (Merluccius capensis and M. paradoxus) were examined. The fatty acid composition of lipids extracted from the livers, muscle, and skin of the two species was determined. Also, a comparison was made between the fatty acid composition of the phospholipid and triglyceride fractions of the lipids. The M. capensis species were caught at depths of 173 to 224 m in water at temperatures of 8.84° to 9.93° C, and water oxygen content of 3.86 to 4.85 ml/l. The M. paradoxus samples were caught at depths of 429 to 530 m in water at temperatures of 5.20° to 6.21° C. and water oxygen content of 4.93 to 6.41 ml/l.

Considering the species differences in conformation, fat content of organs, and fatty acid composition of lipids, only one difference was consistent--the difference in unsaturation of skin lipids compared to muscle lipids. The lipids of the skin of M. paradoxus were generally relatively unsaturated as compared with those of the dark or even light muscle from the same or similar fish. This difference may be due to the fact that the deeper living M. paradoxus is exposed to colder water. The lipids from the prespawning M. paradoxus generally contained less of the $C_{20:5}$, $C_{22:5}$, and $C_{22:6}$ fatty acids than did the comparable lipids

3.6 FOOD DEHYDRATION, SECOND EDITION, VOLUME 2
(3.5)(3.4)
(3.7)(6.134)

Van Arsdell, Wallace B., Michael J. Copley, and Arthur I. Morgan, Jr. (Western Regional Research Laboratory, U.S. Dept. of Agriculture, Albany, Calif.)
Avi Publishing Co., Inc., Westport, Conn. (1973), 529 pp.

In volume 1 of the second edition, chapters 1 through 8 contain information on the physical basis of food dehydration, the kinds of equipment used, and the operations of a food dehydration plant. In volume 2 of the second edition, chapters 9 through 20 concern the commercial dehydration of major food commodities such as vegetables, fruits, juices, milk, meats, fish, cereal grains, and low-water-activity food preparations. In chapter 14, "Dehydration of Fishery Products," the following preservation methods are covered including a description of the process and other aspects such as nutrition, microbiology, and spoilage related to the process: air drying, smoke processing, salt drying (dry salting and brining), and freeze-drying. A short section of the chapter is given to the production of fish meal and fish flour and the various methods of drying the product. The chapter contains 6 figures, 1 table, and 68 references. An appendix of the book contains an alphabetical listing of the technical terms used in food dehydration. A short index is also given. SW

4.13 (1.53)

from M. capensis. Thus the lipids of hake from shallower water may possess a greater tendency to go rancid.

The major saturated fatty acid in the lipids of hake is the one with 16 carbon atoms; the major monoenoic acid is C_{18}; the $C_{22:6}$ fatty acid is the dominant polyenoic fatty acid; and $C_{20:5}$ fatty acid is the next most abundant. The lipids of the light muscle have the highest levels of the long-chain unsaturated fatty acids; the lipids of the liver are poorer in $C_{22:6}$ fatty acid than the lipids of the skin and muscle. Both the light and dark muscle contain sufficient unsaturated fatty acids so that development of oxidative rancidity in stored hake is likely.

The lipids of the dark muscle show a relatively small proportion of phospholipids compared to the lipids of the light muscle and liver. This fact does not support the theory that dark muscle is metabolically more active than light muscle. The phospholipids are particularly rich in the $C_{16:0}$ and $C_{22:6}$ fatty acids.

Tables are given on the fatty acid composition of hake organs; mass, composition, and organ fat composition of hake; and phospholipid composition of lipids of hake.
[5 tables, 17 references] FTP

3.4 [MECHANIZED PRODUCTION OF COLD SMOKED FISH]

Piletskii, M. M. (Baltiiskii Rybokombinat, U.S.S.R.)
Rybnoe Khozyaistvo, No. 3, 59-63 (1973) [In Russian]
Food Science and Technology Abstracts 5, No. 12, 144, Abstract No. 12R587 (Dec. 1973)

An analysis was made of the process for the cold-smoking of fish in different designs of smoke houses in order to determine the feasibility of automating the operations. The labor requirements for dry and wet salting of fish and the comparative economics of production of cold-smoked fish in four plants are given. FTP

3.63

solids in the semidry layer. Results of simulation of product drying in three dimensions indicated that the rate of atmospheric freeze drying can be increased most effectively by reducing particle size of the food and by increasing the surface mass transfer coefficient.
[7 figures, 2 tables, 21 references] FTP

3.14 NITROFURAN DERIVATIVES AS FOOD PRESERVATIVES

Ueno, Saburo, Masanori Ikuzawa, Satori Nishiyama, Toshihiko Wada, and Fumio Hirose (Kureha Chemical Industry Co., Ltd.) (pat.)
Japan 73 03,382 (Jan. 30, 1973)
Chemical Abstracts 80, No. 4, 26079j (Feb. 4, 1974)

3.9 FERMENTED MARINE FOODS. II. STORAGE EFFECT OF SUGARS AND MONOGLYCERIDES ON CUTTLEFISH SHIOKARA (1.89)

Uno, Tsutomu (Hakodate Fish. Exp. Stn., Hakodate, Japan)
Chemical Abstracts 79, No. 19, 114115c (Nov. 12, 1973)

4.6 ANTIOXIDANT MIXTURES FOR USE IN FOOD

Pongracz, G. (Research Dept., F. Hoffmann-La Roche & Co., 4002 Basel, Switzerland)
International Journal for Vitamin and Nutrition Research 43, No. 4, 517-525 (1973)
(Williams & Wilkins Co., 428 E. Preston St., Baltimore, MD 21202)

Other reports indicate that increasing concentrations of ascorbylpalmitate (AP) show a progressively increasing inhibition of autooxidation (AO) in dietary fats. The tocopherols (TL) also have the AO effect. The use of AP and TL together is more effective in AO than either used alone. Fat soluble basic substances (such as lecithin) can be used as synergists of the AO effect.

The stability of sunflower, soybean, peanut, and palm oils, lard, and butterfat with various AO substances was tested. The fat samples were stored in uncovered Petri dishes at 80° and 100° C. The AO activity or the fat stability was continuously measured by the peroxide value method. The activity of ascorbic acid esters was evaluated; these esters included ascorbyl-laurate (AL), -myristate (AM), -palmitate (AP), -oleate (AOL), -stearate (AS), and erythorbyl-palmitate (EP). The results of these tests indicated that the suitability for the AO effect was in the following order: AL>EP>AM>AP>AS. Tocopherol as an AO was effective only on butterfat and lard. The gallates, propyl-, isopropyl-, butyl-, isobutyl-, octyl-, and dodecylgallate were tested in peanut oil at 100° C. The results indicate that all the gallates were effective AO substances with little variation. Octylgallate is

6.19 (1.84) DEHYDRATED SCALLOP VISCERA, A POTENTIAL COMPONENT OF POULTRY RATIONS

Blamberg, D. L., and D. C. O'Meara (Dept. of Animal and Veterinary Sciences, University of Maine, Orono, ME 04473)
Poultry Science 12, No. 3, 1203-1205 (May 1973)

Only the adductor muscle of scallops is harvested; the viscera, constituting 60% of the nonshell portion, is usually discarded. Earlier reports indicated unsuccessful attempts to reclaim scallop viscera for various purposes including addition to feeds.

Analyses were performed to determine the proximate composition and amino-acid composition of scallop viscera. Viscera of freshly harvested scallops were ground, slurried, and dried at 38° C; 9 kg of viscera could be dried per 24-h day when the air intake to the drying chamber was 0° C or less. The dried product could easily be crumbled. Proximate composition was determined by AOAC procedures. Dehydrated scallop viscera showed the following composition: moisture, 7.83%; protein, 50.01%; ash, 18.75%; ether extract [considered to be fats], 16.49%; and nitrogen-free extract [as glycogen], 6.88%. Acid hydrolysis and column chromatography were used to determine amino acids. In addition to other amino acids, the following were present: lysine, 3.43%; methionine, 1.10%; tryptophan, 0.38%; valine, 2.01%; and glycine, 6.74%. These results indicate that the material is high in protein and energy; the authors speculate that scallop viscera could be expected to contain 2.9 kcal per gram of metabolizable energy. The high salt content would substantially reduce the need for salt supplement in poultry rations.

6.15 (6.18) MUSHROOM CULTURE: A NEW POTENTIAL FOR FISHERY PRODUCTS

Green, John H. (National Marine Fisheries Service, NOAA, College Park, MD 20740)
Marine Fisheries Review 36, No. 2, 27-32 (Feb. 1974)

This paper describes research sponsored by the National Marine Fisheries Service, NOAA, and being done at the Mushroom Research Center, Pennsylvania State University, to explore menhaden (Brevoortia tyrannus) fish solubles and fish oils as nutrient supplements in mushroom culture. Fish solubles were successfully substituted for other organic nitrogen supplements commonly used in mushroom composting and subsequent mushroom culture. These experiments, performed in 1971-1972, indicated that in certain situations larger mushrooms were produced when combinations of fish solubles and other organic nitrogen supplements were used. Currently under investigation in 1973-1974 is the use of fish oils, substituted for polyunsaturated vegetable oils, to stimulate increased yields of mushrooms. A brief description of mushroom cultivation is given with emphasis on nitrogen supplementation of composts and polyunsaturated oil stimulation for increased mushroom yields.

These investigations of menhaden fish solubles and fish oil could open up new markets for these products. At the same time, they could offer the mushroom grower new and inexpensive sources of nitrogen supplements or nutrient stimulants. Both industries could benefit from these applications of fishery products or by-products.

6.190 (0.6) PROTEIN QUALITY OF SOME NIGERIAN FEEDSTUFFS. I. CHEMICAL ASSAY OF NUTRIENTS AND AMINO ACID COMPOSITION

Fetuga, B. L., G. M. Babatunde, and V. A. Oyenuga (Dept. of Animal Science, University of Ibadan, Ibadan, Nigeria)
Journal of the Science of Food and Agriculture 24, No. 12, 1505-1514 (Dec. 1973)

Data are given on crude protein, ether extract, crude fiber, ash, nitrogen-free extract, calcium, phosphorus, and gross energy content, of eight types of feedingstuffs (yellow maize, palm kernel meal, groundnut meal, cashew nut meals, African locust bean meals, blood meal, skim-milk powder, and fish meal). In addition, data are presented on the content of 20 amino acids of the eight feedingstuffs and freeze-dried egg. The methods of analyses used were those in Official Methods of Analysis, 10th ed., Association of Official Agricultural Chemists, Washington, D.C. (1970). These data are being published in order to provide basic information that could aid in better utilization of these feedingstuffs from the standpoints of efficiency, economy, and nutrition. Some data are presented in the table that follows. Most of the feedingstuffs showed low values for lysine, methionine, and tryptophan.

[3 tables, 13 references] FTP

6.15 (6.18)

The estimation for the consumption of polyunsaturated oils as stimulants for increased mushroom production would be a maximum of 11,700 tons of oil (2.8 million gallons) per year based on 1973 mushroom production figures (USDA 1973). This is based on the recommendation of 110 gallons of oil per 4,000 sq ft of mushroom growing area, or approximately 45 tons of compost, which is the capacity of the common small growing unit ("single" mushroom house). At a market price of 12 cents per pound (an approximate 1972 price), a potential domestic market for fish oils of $2.8 million could be realized.
[13 figures, 2 tables, 9 references] SW

6.13 FLAVORED FISH MEAL

Ajinomoto Co. Inc. (pat.)
Japanese Patent 73 28666
Food Technology 28, No. 2, 84 (Feb. 1974)

Fish meal is soaked in isopropanol to remove fat. Flavoring agents or an Aspergillus protease is added to the defatted meal. FTP

6.190 (0.6)

Type of Nigerian feedingstuff	Protein (crude)	Ether extract	Crude fiber	Ash (silica-free)	Nitrogen-free extracts	Calcium	Phosphorus
Palm kernel meal	18.70	6.74	10.3	4.22	49.61	0.28	0.74
Groundnut meal	49.88	5.53	4.57	5.93	26.64	0.18	0.70
Cashew nut (good kernel)	21.18	48.09	0.68	3.3	22.2	0.034	0.88
Cashew nut (good kernel) (ether-extracted)	36.04	7.44	1.23	5.10	42.19	0.060	1.64
Cashew nut (scrap kernel)	21.62	45.5	1.35	3.77	23.42	0.030	0.80
Cashew nut (scrap kernel) (ether-extracted)	35.79	71.59	2.84	5.78	39.96	0.05	1.51
Yellow maize	9.60	3.83	1.29	1.37	70.59	0.08	0.30
Blood meal	80.95	0.97	0.72	4.67	1.39	0.63	0.22
Fish meal	64.80	7.50	0.36	16.82	2.09	5.60	3.31
Skim-milk powder	36.40	0.32	0.02	7.92	49.84	1.28	1.03
African locust bean (seed)	30.03	19.55	12.10	5.38	25.87	0.37	0.28
African locust bean (seed + pulp)	22.68	11.81	18.99	5.86	43.57	0.40	0.28

4.6

now acceptable under the food regulations of a majority of countries. Lecithin is effective as an AO only in combination with AP, TL, and gallate. This combination yields a product that is widely approved for human consumption and has good AO properties. In tests with sunflower seed oil, a combination of AP, lecithin, and αTL was a more effective AO than the commonly used combination of BHT and BHA.
[3 figures, 7 tables, 13 references] SW

6.19 (1.84)

The authors suggest that the oil content of scallop viscera could restrict its use as a protein supplement in poultry rations.

Dehydrated scallop viscera has potential value as an ingredient in poultry rations. Feeding trials, organoleptic tests, and economic evaluations of the finished poultry product will be required to establish the desirability of scallop viscera in poultry feeds.
[2 tables, 10 references] SW

6.19 RATIONS WITH LYSINE SUPPLEMENTS FOR BROILERS

Tkachev, I. F., and E. D. Mantel (Kuban.S.-Kh. Inst., Krasnodar, U.S.S.R.)
Chemical Abstracts 80, No. 1, 2487q (Jan. 7, 1974)

6.190 (0.6) PROTEIN QUALITY OF SOME NIGERIAN FEEDSTUFFS. II. BIOLOGICAL EVALUATION OF PROTEIN QUALITY

Fetuga, B. L., G. M. Babatunde, and V. A. Oyenuga (Dept. of Animal Science, University of Ibadan, Ibadan, Nigeria)
Journal of the Science of Food and Agriculture 24, No. 12, 1515-1523 (Dec. 1973)

The first part (I) of the reports on protein quality of some Nigerian feedingstuffs was published on pages 1515-1523 of the same issue of this journal. It contained data on chemical nutrients and amino acids. Part II contains data on the biological quality of the protein of the same feedingstuffs. Some of the data are shown in the table that follows.

[3 tables, 19 references] FTP

6.35 A SPECTROFLUORIMETRIC PROCEDURE FOR THE ASSAY OF CARRAGEENAN

Cundall, R. B. (Dept. of Chemistry, University of Nottingham, Nottingham, NG7 2RD, England), G. O. Phillips, and D. P. Rowlands
Analyst 98, No. 1173, 857-862 (Dec. 1973)

Carrageenan is the name given to closely similar sulfated polysaccharides derived from seaweed. Carrageenan is used as a stabilizer in ice cream and frozen milk products in concentrations between 50 p/m and 1%. The quantitative determination of carrageenan in milk products is important in quality control. The available methods for the determination of carrageenan in the presence of other carbohydrates and proteins are time consuming.

Other workers have determined the ester sulfate content of various plant polysaccharides by the interaction of their anionic sites with cationic dyes. When bound, some cationic dyes, such as acridine orange or proflavine, either become nonfluorescent or show a fluorescence emission that is shifted to longer wavelengths and can easily be separated from the fluorescence of the unbound dye. Metal ions can release the bound dye by competing for the anionic sites [on the polysaccharides]. Acridine orange is suitable for use in the determination of carrageenan. The free dye is strongly fluorescent and upon binding to the anionic groups in polysaccharides the green fluorescence of the unbound dye shifts to red. The fluorescence of the unbound dye (wavelength 530 nm) is used in the method developed by the authors for the assay of carrageenan in mixed samples.

6.32 SEASONAL CHANGES IN THE CHEMICAL COMPOSITION OF THE RED ALGA HYPNEA MUSCIFORMIS

Abdel-Fattah, A. F. (Laboratory of Microbiological Chemistry, National Research Center, Dokki, Cairo, Egypt), N. M. Abed, and M. Edrees
Australian Journal of Marine and Freshwater Research 24, No. 3, 275-279 (Nov. 1973)

There is a growing interest in the constituents of seaweeds because of their industrial importance. The composition of marine algae varies depending on the season of the year. Investigations were performed to determine the constituents in the red alga H. musciformis in different seasons. Samples of the alga were collected at Roushdy, Alexandria [Egypt] and various minerals, carbohydrates, proteins, amino acids, fats and sterols were determined.

Lipids constituted a major component of the algal material and reached a maximum level in samples taken in February and a minimum level in May. The unsaponifiable fraction comprised 34% of the total lipid content of samples taken in February and 55% of the lipid content in samples taken in May. The sterol compounds in the unsaponifiable fraction were lanosterol and cholesterol. Protein also comprised a major component of the algal material, reaching a maximum level in samples taken in the summer; protein levels were at a minimum in the winter samples.

The table that follows show the seasonal variation in the components of the alga.

6.35 HEAT-INDUCED CHANGES IN THE ZONE ELECTROPHORETIC PATTERNS OF CARRAGEENAN STABILIZERS

Hansen, Poul M. T., and Mary W. Renoll (Dept. of Food Science & Nutrition, Ohio State University, Columbus, OH 43210)
Journal of Food Science 39, No. 1, 103-107 (Jan.-Feb. 1974)

Carrageenan is used in evaporated milk and in infant milk products as a stabilizer to retard creaming. The purpose of this study was to determine, by zonal electrophoresis, if carrageenan in stabilized milk is altered by heat. Carrageenan stabilizer (0.4%) was incorporated by moderate heating (60° C/30 min) into a synthetic milk-salt system [R. Jenness and J. Koops, Neth. Milk & Dairy J. 16, 153 (1962)] and adjusted to pH levels between 4.6 to 6.7. The milk-salt solution contained the cations Na, K, Ca, and Mg and the anions P, Cl, SO_4, CO_2, and citrate. The carrageenan solutions (in the synthetic system) were heated at 122° C for specified times up to 30 min. The resulting test solutions were then treated with cation exchange resin in the sodium form and examined by zonal electrophoresis on cellulose acetate membranes (0.075 M calcium malonate buffer, pH 2.9, with 15% ethyl alcohol added, v/v), followed by staining with toluidine blue. The carrageenan samples consisted of the sodium salts of λ- and κ-carrageenan from the potassium fractionation of Chondrus crispus extract, sodium salt of E. spinosum extract (ι-carrageenan), and a commercial product consisting of a calcium salt of unfractionated Chondrus extract.

6.32

Composition of H. musciformis in different seasons

Component	Aug. 1971	Feb. 1972	May 1972	Component	Aug. 1971	Feb. 1972	May 1972
	%	%	%		%	%	%
Total ash	14.00	30.00	21.10	Glucuronic acid + glucurone	5.00	14.00	10.00
Ca^{2+} in ash	18.93	24.80	18.49	Crude protein	22.00	14.00	18.00
Mg^{2+} in ash	18.48	13.90	9.13	Total lipids	1.20	2.60	0.90
Mannitol	2.50	0.80	1.10	Unsaponified lipid fraction	0.50	0.90	0.50
Galactose	7.00	4.00	4.00	Total sterols	0.32	0.60	0.21
Glucose	3.00	1.00	2.00				
Xylose	2.00	3.00	6.00				
Starch	0.00	0.00	0.00				

[2 tables, 18 references] SW

6.31 PHYSIOLOGICAL ECOLOGY OF GELIDIELLA ACEROSA

Rao, P. Sreenivasa, and V. B. Mehta (Dep. Biosci., Saurashtra Univ., Rajkot, India)
Chemical Abstracts 80, No. 1, 1481w (Jan. 7, 1974)

6.35

κ-Carrageenan produced one stationary and two migrating zones; heating caused a reduction in the intensity of the stationary zone and an increase in the mobility and separation of the migrating zones. These changes were the least at pH 6.7, but they increased with decreases in pH.

λ-Carrageenan produced a diffuse migrating zone; heat treatment at pH 6.7 resulted in increased mobility of the zone. The unfractionated carrageenan formed a pattern similar to that of the κ-carrageenan and responded to heat and pH in a similar manner.

Thus, whole carrageenan and its fractions undergo alterations under severe heat treatment, particularly at low pH values. Other workers have shown that other food stabilizers are also affected by high-temperature processing. No significant alterations to carrageenan electrophoretic patterns occur under moderate heating (122° C/5 min) at pH 6.7.
[8 figures, 1 table, 9 references] FTP

6.34 FLOWABILITY INCREASE OF ORE CONCENTRATES (6.36)

James, Ian, and Jim Pearce (Fosco International Ltd.) (pat.)
German Offen. 2,312,915 (Sept. 27, 1973)
Chemical Abstracts 80, No. 4, 17793k (Jan. 28, 1974)

6.190
(0.6)

Type of Nigerian feedingstuff	Protein efficiency ratio (PER)	Net protein utilization (NPU)	Protein retention efficiency (PRE)	Net protein utilization, standardized (NPUstd)	Biological value (BV)	Apparent digestibility	True digestibility
						%	%
Cashew nut extraction meal (good grade kernel)	2.01	4.01	64.2	63.0	68.6	83.8	91.8
Cashew nut, scrap kernel, meal	1.12	3.13	50.1	46.7	55.3	77.9	84.6
Palm kernel meal	1.27	2.62	42.0	44.1	56.7	67.9	74.2
Fish meal	3.69	4.88	78.1	76.0	81.7	85.8	93.4
African locust bean (seed)	-3.19	1.16	18.6	19.8	22.3	68.1	75.9
African locust bean (seed + pulp)	-2.54	1.26	20.1	20.9	23.7	73.8	81.6
Skim-milk powder	2.55	4.21	67.3	65.4	71.0	86.4	91.8
Blood meal	-2.46	0.83	16.1	18.9	19.3	87.9	98.2
Casein	2.78	4.54	72.6	74.3	76.8	86.4	94.6
Freeze-dried, ether-extracted, whole egg	3.94	6.04	96.6	94.0	98.4	93.7	98.4
Groundnut meal (commercial sample)	1.53	3.55	56.8	54.2	60.2	84.9	90.1

6.35

Stock solutions for testing were prepared that gave about 50 mg of carrageenan per 50 ml of solution. In one series of samples, 1 ml of polysaccharide stock solution was diluted 10 times and added to 5 ml of 1.54×10^{-4} solution of acridine orange; the mixture was diluted to 50 ml and gently shaken. Other solutions were prepared in this manner with increasing amounts of the polysaccharide. In another series of samples carrageenan solution was added [incrementally] in 0.01 ml portions to standard dye solutions by using a micrometer syringe. Either method of preparing test solutions gave reproducible results. The absorption spectrum of the samples was measured at a wavelength range of 400 to 500 nm, and the fluorescent emission intensity was determined relative to a sample of unbound dye. Sharp end-points were obtained by using spectrofluorimetric data on a graph. In the presence of calcium chloride and other commonly used stabilizers [such as carboxymethylcellulose] the method continued to give good end-points. The method is simple, accurate, and rapid for determining carrageenan in a conventional stabilizer mixture. The method is also successful when the final commercial product contains protein, salts, and other materials.
[4 figures, 2 tables, 15 references] SW

6.36 ANTIBIOTIC ACTIVITY OF THE CHRYSOPHYTE OCHROMONAS MALHAMENSIS

Hansen, Jens Aage (Inst. Plant Physiol., Copenhagen, Denmark)
Chemical Abstracts 80, No. 1, 1314u (Jan. 7, 1974)

6.51 USES OF CATFISH-PROCESSING BYPRODUCTS AND UNDESIRABLE SPECIES OF FISHES IN FORMULATED CATFISH FEEDS

Pappas, C. J., C. W. Deyoe, and O. W. Tiemeier (Kansas State University, Manhattan, Kans.)
Feedstuffs 46, No. 6, 29 (Feb. 11, 1974)

The increased production and processing of farm-raised catfish has resulted in increased quantities of [unwanted] trimmings. This has created a disposal problem for the processors. Previously, limited quantities of trimmings were disposed of by burying them, feeding them raw to swine, or dumping them in fish ponds. Since trimmings comprise 40% of the whole fish, there is a financial loss in fish trimmings. Undesirable species (or fish currently of little commercial value) have created another disposal problem which has delayed removing such fish from ponds, reservoirs, and rivers.

A potential use of catfish-processing trimmings and undesirable species appeared to be as a constituent in formulated catfish feeds. A study was performed to determine if acceptable channel catfish feed could be prepared using a catfish waste and whole fish buffalo-carp combination. Growth performance and feed conversion of catfish fed on these diets were compared with catfish fed a diet without fish products. The test diets were prepared by grinding thawed previously frozen whole catfish and the mixture of buffalo and carp in a commercial meat grinder; the die had 1/8-in openings. The ground fish was mixed with dry ingredients such as grain meals, distilling byproducts, and other standard feed ingredients. The mixture was then reground in a hammermill and sent through an extruder mill to produce expanded, floatable pellets. The rations were formulated to contain meat

7.42 ATOMIC ABSORPTION SPECTROMETRIC DETERMINATION OF ARSENIC

Hoover, William L., James R. Melton, Peggy A. Howard, and James W. Bassett, Jr. (Dept. of Agricultural Analytical Service, Texas A. & M. University, College Station, TX 77843)
Journal of the Association of Official Analytical Chemists 57, No. 1, 18-21 (Jan. 1974)

The official AOAC method for arsenic in feeds was adapted to an atomic absorption spectrophotometric technique in which the arsenic from foods is trapped in the absorbing solution and is aspirated into the flame. Two techniques are used. The first is used for food samples containing more than 2.5 p/m of arsenic; it involves the aspiration of a solution in which generated arsine gas has been trapped. The second technique is used for foods containing less than 1 μg arsenic per gram of food; it involves the introduction of generated arsine gas into the flame by means of a simple arsine delivery apparatus. The second technique is useful when only a small size sample is available. Both techniques use common fuels, air, and acetylene.

As little as 0.5 μg of arsenic per gram of food can be determined in a 10-g sample. The sensitivity attained from a 10-g sample of food is 0.1 μg As/g. A comparison of the results by the AOAC method and the methods proposed in this report for arsenic in fish samples is shown in the table that follows.

6.54 (0.6) A COMPARISON OF THE EMULSIFICATION CAPACITIES OF SOME PROTEIN CONCENTRATES

Crenwelge, D. D., C. W. Dill, P. T. Tybor, and W. A. Landmann (Depts. of Animal Science and Biochemistry, Texas A. & M. University, College Station, TX 77843)
Journal of Food Science 39, No. 1, 175-177 (Jan.-Feb. 1974)

The functional capacity of protein isolates is a primary consideration in their usefulness in food products. In this study the emulsification capacity of globin, cottonseed protein, soy protein, and nonfat dry milk was determined under experimental conditions optimized for blendor speed, pH, rate of oil addition, and protein concentration. The results of the emulsification capacity (oil phase volume at inversion) determinations of all four proteins indicated that they all were good emulsifiers. The amount of each protein required to obtain maximum oil phase volume (the comparative measure of the emulsification capacity) was different--0.4% for globin, 0.88% for cottonseed protein, 0.98% for soy protein, and 1.19% (expressed as a percentage of the aqueous phase) for milk protein. The emulsification capacity for each of the proteins tested seemed to relate closely to the level of soluble protein in the sample.
[5 figures, 1 table, 14 references] FTP

7.52 AN INVESTIGATION OF HYDROLYTIC TECHNIQUES FOR THE AMINO ACID ANALYSIS OF FOODSTUFFS

Davies, Michael G., and Alan J. Thomas (Lord Rank Research Centre, Lincoln Road, High Wycombe, Bucks, England)
Journal of the Science of Food and Agriculture 24, No. 12, 1525-1540 (Dec. 1973)

At the present, 6 N-HCl is generally used to hydrolyze proteins in order to study their amino-acid sequences. But, many factors can cause the amino-acid composition to differ from that of the protein from which it is derived. For example, the ease with which amino acids are liberated from peptides varies; the optimum time of hydrolysis for complete liberation of certain amino acids depends on the nature of the linkage in each protein. Information is presented on a survey of hydrolytic methods for the amino-acid analysis of foods and on the advantages and disadvantages of the methods. In addition, results are given on the determinations of amino acids after hydrolysis of proteins with hydrochloric acid, sulfuric acid, perchloric acid, p-toluene sulfonic acid, and sodium chloride. The test samples consisted of a pure protein (casein) and a potential food protein of microfungal origin (Fusarium graminearum); the results are shown in graphic form.

Adding some cation exchange resin to acids catalyzed the hydrolysis of some peptide bonds containing aspartic acid, threonine, serine, glutamic acid, valine, and isoleucine. Although several methods gave close agreement for the analysis of a pure protein, hydrolysis with 6 N-hydrochloric acid gave the largest yield of most amino acids in the food proteins.

Asp, Thr, Ser, and Glu are released rapidly with sulfuric acid and perchloric acid, but Thr and Ser show progressive destruction with time. Cys is unstable in

7.42 DETERMINATION OF LOW LEVELS OF CADMIUM IN FOODS USING A CHELATING ION EXCHANGE RESIN

Baetz, Richard A. (Food and Drug Administration, 3032 Bryan St., Dallas, TX 75204), and Charles T. Kenner
Journal of the Association of Official Analytical Chemists 57, No. 1, 14-17 (Jan. 1974)

This method for determining cadmium in foods utilizes the AOAC digestion procedure (HNO_3, H_2SO_4, H_2O_2) catalyzed by V_2O_5. The digest is neutralized and the cadmium is separated by a chelating ion-exchange resin. The cadmium is then eluted with H_2SO_4 and determined by atomic absorption spectrophotometry. When 0.30 p/m of cadmium was added to each of seven food commodities, the average recovery was 94% with a standard deviation of 2.8%; these results compare favorably with those obtained with the AOAC dithizone extraction method. About 6 h are required to transfer, wash, and elute six samples by the proposed method. As little as 10 p/m of cadmium in foods can be determined by the proposed method.
[2 tables, 10 references] FTP

7.52

perchloric acid and with higher levels of sulfuric acid. Val, Ile, and Leu are released slowly, but with sulfuric acid higher values are obtained than with hydrochloric acid. Met is progressively destroyed with high levels of sulfuric acid and it is in large part converted to sulfoxide by perchloric acid. With 16 N and 24 N sulfuric acid, destruction of Thr was pronounced. Higher values for His were obtained with sulfuric acid and perchloric acid than with hydrochloric acid. Lys was released slowly in sulfuric acid, but higher concentrations of the acid accelerated its release.

The amino-acid values obtained with sodium hydroxide were generally lower than those with acid. However, the values obtained for His, Leu, and Tyr were close to those obtained with 6 N-HCl.
[3 figures, 3 tables, 71 references] FTP

7.53 ESTIMATION OF LIPIDS IN MARINE ANIMALS AND TISSUES. DETAILED INVESTIGATION OF THE SULFOPHOSPHOVANILLIN METHOD FOR TOTAL LIPIDS

Barnes, H., and J. Blackstock (Dunstaffnage Mar. Res. Lab., Oban/Argyll, Scotland) Chemical Abstracts 79, No. 25, 144001e (Dec. 24, 1973)

6.51

scraps with no fish; 5% raw catfish plus meat scraps; or 5% raw buffalo-carp mixture plus meat scraps. The protein level was maintained at about 35% in the formulations. Seven hundred fish in six cages were tested. Feeding was at the rate of 3% of the total weight of fish per cage, 6 days per week. The trials were conducted from June 5 to Sept. 18, and every 14 to 20 days samples of fish from each cage were weighed. The results indicate that gains were similar for catfish fed rations containing raw catfish, buffalo-carp, and controls fed a ration containing meat scraps with no fish products. Floating characteristics of the test feeds were excellent and storage life of the feeds were similar to feeds containing only meat scraps.

The authors suggest that fish and fish trimmings can be used in floating catfish feeds without excessive processing. Additionally, when available from processing plants, raw fish and fish trimmings may be cheaper than other meat ingredients in floating catfish feeds.
[3 tables, 3 references] SW

6.59 PROTEIN RECOVERED FROM INDUSTRIAL WASTE WATER AS FEED FOR CHICKS (2.3)

Herstad, Olav, and Harald Hvidsten (Dep. Poultry Fur Anim. Sci., Agric. Univ. Norway, Ås, Norway)
Chemical Abstracts 80, No. 5, 26140x (Feb. 4, 1974)

7.42

Sample	Arsenic content		
	AOAC colorimetric method	Proposed technique 1 (liquid aspiration)	Proposed technique 2 (arsine vaporization)
	p/m	p/m	p/m
Fish muscle	3.1±1.0	3.1±1.0	3.0±0.3
Fish muscle	5.4±1.2	6.7±0.4	6.8±0.3
Crab	8.0±2.6	6.4±0.8	6.1±1.0

[1 figure, 1 table, 11 references] FTP

7.599 RAPID METHOD FOR DETERMINATION OF INOSINE, HYPOXANTHINE, URIC ACID, AND NUCLEOTIDES IN FISH MUSCLE BY CONTINUOUS GRADIENT COLUMN CHROMATOGRAPHY (7.8)

Kato, Noboru, Hitoshi Uchiyama, and Fumiaki Uda (Tokai Reg. Fish. Res. Lab., Tokyo, Japan)
Chemical Abstracts 80, No. 7, 35882t (Feb. 18, 1974)

7.593 DETERMINATION OF SH- AND SS-GROUPS IN SOME FOOD PROTEINS USING ELLMAN'S REAGENT

Beveridge, T., S. J. Toma, and S. Nakai (Dept. of Food Science, University of British Columbia, Vancouver 8, Canada)
Journal of Food Science 39, No. 1, 49-51 (Jan.-Feb. 1974)

Sulfhydryl (SH) and disulfide (SS) groups in proteins appear to impart certain functional properties to the protein food. For example, the thick gel of eggs probably consists of large glycoprotein molecules crosslinked by SS bonds. And, addition of SH compounds to flour weakens the rheological properties of the flour. This paper is a description of a method for determining SH and SS contents of foods using Ellman's reagent (5,5-dithiobis-2-nitrobenzoic acid). Assay procedures for SH and SS groups in purified proteins using Ellman's reagent have been satisfactory and have the advantage of being simple, rapid, and direct. In this study, the test was applied to flour, egg white, milk, and their products.

For the SH determination, 6.5M urea, or 0.5% sodium dodecylsulfate, were used as the dissociating agent for egg white and skim milk; a mixture of 6.5M urea and 5M guanidine HCl was used for flour and gluten. For the SS determination, SS groups were reduced with 1% to 2% 2-mercaptoethanol in the presence of the appropriate dissociating agent, and the proteins were precipitated by adding 8% to 11% trichloroacetic acid. Total SH (SH plus reduced SS) was determined after the precipitates were dissolved in 8M urea or 0.5% dodecylsulfate at pH 8.0. The color was developed by adding Ellman's reagent and absorbance was measured with

7.9 (0.6) ANALYSIS OF COMMERCIAL SOYA ADDITIVES IN MEAT PRODUCTS

Guy, R. C. E., R. Jayaram, and C. J. Willcox (Central Laboratories, J. Lyons & Co. Ltd., 149 Hammersmith Road, London W14 OQU, England)
Journal of the Science of Food and Agriculture 24, No. 12, 1551-1563 (Dec. 1973)

Soy bean proteins (as isolates, concentrates, flours, or texturized products) may be used in meat products such as hamburgers, pies, sausages, or canned meats. Two basic methods are used to analyze soy proteins in meat. In one method soy proteins are quantitatively precipitated by a specially prepared antiserum. In the other method, the proteins are dissolved in 8 M-urea, sodium dodecylsulfate, or other suitable extracting medium, and then the soy proteins are separated from the soluble meat proteins by starch or polyacrylamide gel electrophoresis. The present study involved the extraction of the proteins with a solution of urea and 2-mercaptoethanol and the separation of the meat and soy proteins by polyacrylamide gel electrophoresis. Hamburgers (beef and fat), sausages (beef, pork rinds, rusk, flour), meat pies (beef, fat, kidney), and meat loaf (pork) were prepared with various levels of soy protein additives, Promine D, Soyolk, or TVP (trade names of commercial products). Two methods were used to extract the proteins from the food products: (1) extraction in 8 M-urea and 1% 2-mercaptoethanol at 18° to 20° C for 16 h or (2) extraction in 10 M-urea and 4% 2-mercaptoethanol at 100° C for 30 min. The extracted proteins were separated by electrophoresis on gels containing 6% polyacrylamide and either 6 M-urea (Method 1) or 8 M-urea (Method 2) using

7.80 (1.12) AN ANALYTICAL AND INTEGRATIVE APPROACH TO SENSORY EVALUATION OF FOODS

Kramer, Amihud (University of Maryland, College Park, MD 20740)
Journal of the Science of Food and Agriculture 24, No. 11, 1407-1418 (Nov. 1973)

Overall sensory evaluation of foods involves at least four senses, each of which may include one to many specific attributes of quality. Thus, the various attributes must be tested separately in order to make an assessment of total quality. Sensory evaluations of foods may be performed directly by a taste panel or by objective chemical tests, which must be validated by high correlation with taste panel responses. Panelists must be trained to evaluate food quality differences; but, untrained persons representative of the target population must be used to determine consumer preference. In both cases, scalar variables (rather than attributes data) should be used for maximum efficiency. The author describes the "sample number ratio" technique for measuring the relative efficiency of taste testing procedures. By this technique, the contribution of specific attributes to total sensory quality of the foods is calculated; in addition, multiple regression analysis in which total quality is the dependent variable and the specific attributes of quality are the independent variables is applied. Only the independent variables that contribute significantly to predictability of total quality of the food are used in the equation. An example of the procedure using data on canned tuna is given.
[1 figure, 23 references] FTP

8.42 (9.19) [MINERAL CONTENTS (Ca, P, Mg, K AND Na) IN JAPANESE DAILY DIET]

Goto, S. (Dept. of Nutr., Tokyo Univ. of Agric., Setagaya-ku, Japan), T. Sawamura, and H. Seki
Journal of the Japanese Society of Food and Nutrition 25, No. 4, 359-361 (1972)
Food Science and Technology Abstracts 5, No. 12, 26, Abstract No. 12G578 (Dec. 1973)

The calcium, phosphorus, magnesium, potassium, and sodium contents of the daily diets of adult people in eight districts of Japan were determined. The average levels of the minerals in the diet per adult per day were: calcium, 574 mg; phosphorus, 934 mg; magnesium, 200 mg; potassium, 1.95 g; and sodium, 4.95 g. Apparently the average daily intake of these minerals by adults in Japan is generally adequate.
[16 references] FTP

7.80 COMPLEX SENSORY ASSESSMENT
(8.80)

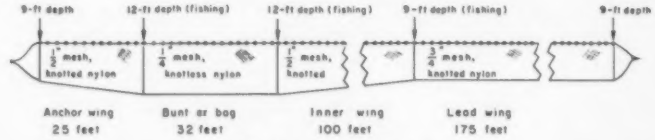
Harries, John M. (Meat Research Institute, Agricultural Research Council, Langford, Bristol, England)
Journal of the Science of Food and Agriculture 24, No. 12, 1571-1581 (Dec. 1973)

Some topics common to food science, psychology, and statistics are discussed relative to practical sensory experimentation with difficult foods, or with simple foods in difficult situations. The author suggests ways in which a knowledge of statistics and psychometrics can help the food scientist in future development of sensory methods. In fact, the ability of a food scientist to extract potentially useful information in situations involving complex sensory assessment may depend on his knowledge of all three disciplines. This paper is a review of selected papers in the field. The author hopes that his paper may provide some leads to encourage future experimenters in the complex field of sensory assessment to exploit the ideas of psychophysics and statistics with the view to improving certain present methods.
[1 figure, 56 references] FTP

9.1 VARIABLE-MESH BEACH SEINE FOR SAMPLING JUVENILE SALMON
(2.1125) IN COLUMBIA RIVER ESTUARY

Sims, Carl W., and Richard H. Johnsen (National Marine Fisheries Service, NOAA, Seattle, WA 98112)
Marine Fisheries Review 36, No. 2, 23-26 (Feb. 1974)

A 332-foot variable-mesh beach seine has been developed to sample juvenile salmon, Oncorhynchus spp., in the Columbia River estuary. This net is designed for a two- or three-man operation and can be set with a small boat (18-20 feet) powered by an outboard engine (40 hp minimum). The net is particularly effective at capturing juvenile fall chinook salmon, O. tshawytscha, coho salmon, O. kisutch, chum salmon, O. keta, and cutthroat trout, Salmo clarki; it can also be used to sample various other species in the estuarine environment.



Variable depth beach seine

[2 figures, 2 tables, 1 reference] Reprinted in part

7.8 EFFECT OF HYDROCOLLOIDS ON ORAL VISCOSITY AND
(0.39) BASIC TASTE INTENSITIES

Pangborn, Rose M., Ida M. Trague, and Alina S. Szczesniak (Dep. Food Sci. Technol., Univ. California, Davis, Calif.)
Chemical Abstracts 80, No. 3, 13810r (Jan. 21, 1974)

7.8 FISH FRESHNESS TESTING

Tokaiku Marine Products Research Inst. (pat.)
Japanese Patent 73 30519
Food Technology 28, No. 2, 84 (Feb. 1974)

The inosine and hypoxanthine levels in fish are used as an indicator of the freshness of the fish. FTP

7.9 CHEMICAL AND MICROBIOLOGICAL DETERMINATION OF ANTIBIOTICS.
(9.19) MICROBIOLOGICAL DETERMINATION OF VARIOUS ANTIBIOTICS

Langner, H. J. (Inst. für Lebensmittelhygiene, Fleischhygiene und-techn., Freie Univ., Berlin, West Germany), and U. Teufel
Chemie Mikrobiologie Technologie der Lebensmittel 2, No. 3, 71-78 (1973) [In English]
Food Science and Technology Abstracts 5, No. 12, 9, abstract No. 12C325 (Dec. 1973)

A "General Inhibitor Test" for the easy and rapid detection of antibiotics in foodstuffs was developed. To pinpoint the individual antibiotic detected, after bacterial growth inhibition is exhibited, further chemical and/or physical separation methods are required. The authors recommend TLC and low-voltage electrophoresis combined with microbiological tests. FTP
[45 references]

7.593

a spectrophotometer. Data were obtained on the SH and SS values for β-lactoglobin, ovalbumin, κ-casein, α_{s1}-casein, α_{s5}-casein, egg white, skim milk, their dried products, flour, and gluten; the values obtained were in good agreement with those published in the literature. Recoveries of SH ranged from 91% to 98%; those for SS ranged from 89%-102%.
[2 figures, 3 tables, 26 references] FTP

7.9 (0.6)

a 0.06 M-Tris-glycine buffer, pH 8.6. Quantitative estimation of the soy proteins was by densitograms of the stained protein bands.

Both methods gave quantitative results for the analysis of soy protein additives in hamburgers and sausages. Method 1 also gave quantitative results for meat pie fillings and canned meat loaf products.
[6 figures, 1 table, 8 references] FTP

9.10 (9.3) AN EXAMINATION OF THE YIELD PER RECRUIT BASIS FOR A MINIMUM SIZE REGULATION FOR ATLANTIC YELLOWFIN TUNA, THUNNUS ALBACARES

Lenarz, W. H. (Southwest Fisheries Center, National Marine Fisheries, NOAA, La Jolla, CA 92037), W. W. Fox, Jr., G. T. Sakagawa, and B. J. Rothschild
Fishery Bulletin 72, No. 1, 37-61 (Jan. 1974)

Some of the conceptual foundations of yield-per-recruit analysis as a management tool and as applied to the Atlantic yellowfin tuna fishery were critically explored. Problems examined include: (1) estimating the current state of the fishery in terms of a knife-edged recruitment approximation, (2) inferring consequences of management action from the yield-per-recruit isopleth, (3) the difficulty in achieving a maximum yield per recruit when there exist several gear types exploiting different size ranges, (4) the difficulty in obtaining projected increases in yield per recruit when the killing and discarding (dumping) of fish smaller than the optimum size occurs, and (5) the possible interaction between a size limit and the projection of the maximum sustainable yield.

In employing yield-per-recruit analysis to the Atlantic yellowfin tuna fishery, two approaches were taken--one approach makes use of a wide range of parameter estimates and a number of simplifying assumptions, but little data, and the other approach makes use of considerably more data, but is more confined in the parameter estimates and uses fewer of the simplifying assumptions. The general results of both approaches, assuming no dumping occurs, indicate that only minor increases in yield per recruit would occur if the size at recruitment is increased from our estimate of the present size at recruitment and fishing effort remains

9.12 (0.4) THE CHEMICAL COMPOSITION OF MIDWATER FISHES, AS A FUNCTION OF DEPTH OF OCCURRENCE OFF SOUTHERN CALIFORNIA

Childress, James J., and Mary H. Nygaard (Marine Science Institute and Dept. of Biological Sciences, University of California, Santa Barbara, CA 93106)
Deep-Sea Research 20, No. 12, 1093-1109 (Dec. 1973)

This study was performed to determine whether the chemical composition of fishes could be indicative of their habits and adaptations in the habitat of the deep sea. The fish were caught in the San Clemente Basin off the coast of southern California in midwater trawls. The depth distribution of the fish was from the surface down to 1,100 m. Thirty-seven species were analyzed for water content, ash, carbohydrate, lipid, protein, carbon, hydrogen, and nitrogen. The results of the analyses indicate that the water content of the fish increased with increasing depth of occurrence, and all the other components decreased in concentration with increasing depth including caloric values. The reason for the decreases is due to the change from buoyancy control mechanisms found in shallower living species which depend on metabolic energy, gas bladders, and lipid. The replacement of organic matter, especially the lipids, with body fluids is the cause of a decrease in caloric value with increasing depth. The authors suggest that the reduction in caloric content in the deeper living species decreases the energy required for growth. An exception to decreasing caloric content with increasing depth occurs in those species which migrate to the surface waters at night; these fish have very high caloric contents compared to those species which remain in the lower depth. Furthermore, these high caloric value migrators are the dominant food source of the lower depths and may be important as transporters of energy to that layer. The

9.12 FREEZING RESISTANCE IN WINTER FLOUNDER PSEUDOPLEURONECTES AMERICANUS

Duman, John G., and Arthur L. DeVries (Scripps Institute of Oceanography, University of California, San Diego, La Jolla, CA 92037)
Nature 247, No. 5438, 237-238 (Jan. 25, 1974)

The freezing points of the blood serum of most marine teleosts are in the range of -0.5° to 0.8° C. But some parts of the oceans have temperatures as much as 1° below the lower temperature of the freezing point range, and, thus, many fish must increase the osmotic concentrations of their blood or exist in a supercooled state. The serum of the Antarctic fish Trematomous borchgrevinki contains a group of organic 'antifreeze' compounds (glycoproteins) that help lower the freezing point of the serum. The glycoproteins lower the freezing point of water (without affecting the melting point) by coating the surface of the ice crystals. The crystals, thus, are removed as possible nucleation sites. The present study was carried out to determine whether the freezing resistance in winter flounder is based on a similar mechanism. The researchers determined the freezing point and melting point, and examined the inorganic and organic constituents, of the serum of the winter flounder. The fish was collected by trawl in depths of 3 to 10 m in Head Harbor, St. Margaret's Bay, Nova Scotia, in March. The water temperature was -1.2° C.

The serum of the winter flounder collected in March showed wide differences (0.62°±0.35° C) between the freezing and melting point (for an NaCl solution the difference between melting and freezing is within 0.02° C). This temperature difference is called thermal hysteresis. The sodium and chloride ion levels in the

9.15 (1.23) SCHOOLING HABITS OF INJURED AND PARASITIZED MENHADEN

Guthrie, J. F., and R. L. Kroger (National Marine Fisheries Service, NOAA, Beaufort, NC 28516)
Ecology 55, No. 1, 208-210 (1974)

From catches of menhaden made along the Atlantic and Gulf coasts, the authors observed that the adults which school with the juveniles in estuarine nursery areas are usually injured or are parasitized with the isopod Olencira praegustator. Adult menhaden collected in the ocean, bays, and sounds were undamaged. The parasite O. praegustator appears to debilitate the menhaden, but when the fish are supporting the copepod Lernaeenicus radiatus they do not appear to be debilitated except when heavily infested. When there are many injured and parasitized adult menhaden present in an estuary, they form schools independent of the juveniles. Large injured juveniles remain in the nursery areas longer than similar-sized healthy juveniles and school with the remaining smaller juveniles. The injured and parasitized fish recuperate from the debilitating factors while schooling with slower swimming fish in the estuaries; the recuperated fish do not enter or return to commercial fishing waters until the schools of juveniles in the estuaries leave for the ocean existence. [1 table, 6 references] SW

9.12 (0.4)

authors also suggest that the predators of the migrators evolved to use efficiently this food source; the jaw size of the predators evolved to catch the high caloric content fish which are lethargic during the day. Another result of the study indicates that the respiratory rate of deep-water fishes also decreases with increasing depth of occurrence. Metabolic energy is conserved by low metabolic rate and nearly neutral buoyancy which are achieved by a reduction in protein and skeleton and increases in low density substances.
[6 figures, 2 tables, 25 references] SW

9.11 EXTENSIVE OXYGEN DEPLETION IN MOBILE BAY, ALABAMA
(9.17)

May, Edwin B. (Alabama Dept. of Conservation and Natural Resources, Dauphin Island, AL 36528)
Limnology and Oceanography 18, No. 3, 353-366 (May 1973)

Large areas of bottom water in Mobile Bay, a large estuary on the Gulf of Mexico, are depleted of oxygen in the summer because of salinity stratification in sinks created by a combination of spoil from construction of the Mobile Ship Channel and shoals. The oxygen demand of the water and bottom sediments along the eastern side of the bay is a result of natural processes rather than industrial or domestic pollutants. When the water containing low levels of oxygen is forced toward the beach by the action of easterly winds in the summer, large numbers of demersal fishes and crustaceans migrate shoreward and remain there in a depressed or moribund state. These occurrences have been historically referred to as "jubilees" in the newspapers of the area for over 100 years. In the published accounts of the jubilee, the residents of the area participated in abundant fish and crab harvests in small boats, close to the shore, with little effort. Oxygen depletion and jubilees occurred in the bay before human activity physically modified the bottom, but now the conditions responsible for oxygen are worse than in the past. Mobile Bay does not have the capacity to transport, deposit, dilute, and assimilate its present load of organic matter in the bottom water during the months of June, July, August, and September. Fish losses have occurred and continued losses are to be expected in the future while the present conditions prevail. Continued discharge of oxygen-demanding material or further detrimental modifications that change the patterns of water movement will cause further adverse alterations of the bay's ecology. In general, restriction of the water circulation of an estuary must be avoided if it is to provide multiple use, including waste disposal. [5 figures, 1 table, 33 references] SW

9.10 (9.3)

constant; an increase in fishing effort without changing other aspects of the fishery would not appreciably increase yield per recruit; and an increase in size at recruitment and in fishing effort would result in modest gains in yield per recruit. Specifically meeting the request of the International Commission for the Conservation of Atlantic Tunas, we recommended that a minimum size limit regulation in the vicinity of 55 cm (3.2 kg) be enacted.
[20 figures, 10 tables, 18 references] Authors' abstract

9.12

serum accounted for 58% of the freezing point depression (-1.37° C) of March flounder and 94% for serum from flounder collected in August, when the temperature of the water was 17° C (the serum freezing point was -0.69° C). The major part of the freezing point depression not due to NaCl in the March flounder was associated with the colloidal fraction of the serum. The solutes responsible for the thermal hysteresis probably had molecular weights greater than 3,500 daltons.

Apparently the mechanism of action of the flounder antifreeze is similar to that of the glycoproteins in Antarctic fish. However, the analytical data indicate that the antifreeze of the two fishes differ markedly in composition. Thus, it seems that distantly related families of cold water fishes have adapted to freezing conditions by evolving different large molecular weight compounds that possess similar antifreeze activity.
[2 figures, 1 table, 9 references] FTP

9.15 BINDING OF ACTIVE AND INACTIVE HEMOLYTIC FACTOR OF SEA ANEMONE NEMATOCYST VENOM TO RED BLOOD CELLS

Hessinger, David A., and Howard M. Lenhoff (Dep. Mol. Biol., Univ. California, Irvine, Calif.)
Chemical Abstracts 80, No. 1, 618j (Jan. 7, 1974)

9.16 MICROCAPSULES AS ARTIFICIAL FOOD PARTICLES FOR AQUATIC FILTER FEEDERS

Jones, D. A., J. G. Munford, and P. A. Gabbott (Marine Science Laboratories, Menai Bridge, Anglesey, Wales)
Nature 247, No. 5438, 233-235 (Jan. 25, 1974)

Artificial food particles are acceptable to a range of filter feeders. The authors found, however, that when food is supplied in particulate form (such as egg slurry or minced fish) or adsorbed on the surface of particles it becomes contaminated with bacteria and produces deleterious effects. One approach that has been suggested is the use of microencapsulated diets in which the food components are retained within an artificial membrane. The type of microencapsule needed would depend upon the mode of feeding of the organism. For those larvae or adult organisms which masticate their food, the capsule wall should be impermeable and stable in seawater but be capable of being broken mechanically to allow the contents to be ingested. Such microcapsules having cross-linked nylon-protein walls can be prepared by a modification of the method of T.M.S. Chang, F. C. MacIntosh, and S. G. Mason [Can. J. Physiol. Pharmac. 44, 115 (1966)]. 4,4'-Diamino-2,2'-biphenyldisulphonic acid is used to give the membrane a negative charge, thus reducing aggregation of the capsules. Such capsules can be used to produce defined macromolecular food particles containing starch and protein. One main disadvantage of this type of capsule is that the nylon-protein wall is permeable to small molecules. The purpose of the present study was to show that microencapsulation is a feasible approach towards the development of artificial diets for filter feeders.

9.16 IMPORTANCE OF ZOOPLANKTON MASS CULTURE IN PRODUCING MARINE FISH SEED FOR FISH FARMING

Fujita, Shiro (Aquaculture Research Institute, Nomozaki-cho, Nagasaki Prefecture, Japan)
Bulletin of Plankton Society of Japan 20, No. 1, 49-53 (Oct. 1973) (Faculty of Fisheries, Hokkaido University, Hakodate, Hokkaido, 040 Japan) [In Japanese; English summary]

This paper was presented at the Plankton Symposium: Cultivation and Mass Culture of Zooplankton, sponsored by the Plankton Society of Japan and the Oceanographical Society of Japan, on April 6, 1973 at Tokyo University of Fisheries, Minatoku, Tokyo, Japan.

The rearing of marine fish larvae in Japan was initiated in 1930. From the experience gained in rearing fish larvae since then it is possible to successfully rear the greater part of marine fish larvae relative to eggs that are artificially spawned and fertilized. In addition, since there was no knowledge of suitable food for larvae of the fish, various species of zooplankton, larvae of marine animals, cultured protozoa, and nonliving food were tried at random to feed the cultivated larvae. Food for cultivated larvae should satisfy the following conditions: (1) the larvae should be able to ingest the food; (2) the larvae should be healthy and grow normally on the selected diet; and (3) the food should be available in adequate amounts. In 1965, other workers found that artificially mass cultured rotifers (Brachionus plicatilis) were effective as food for postlarval fry of red sea bream, especially when the rotifer was fed in combination with copepods in the wild

9.16 (1.85)(9.15) ECTOCOMMENSALS AND PARASITES OF SHRIMP FROM TEXAS REARING PONDS

Johnson, S. K. (Dept. of Wildlife and Fisheries Science, Texas Agricultural Extension Service, College Station, TX 77843)
Report No. TAMU-SG-74-207, Texas A. & M. University Sea Grant College Program (Jan. 1974), v + 19 pp. Available from Dept. of Marine Resources Information, Center for Marine Resources, Texas A. & M. University, College Station, TX 77843. $1.00.

Ectocommensals and parasites can become economically important in shrimp culture when heavy infestations occur as a result of intensive rearing or other environmental alterations that accompany artificial cultivation. [Ectocommensalism is the close, harmless association between a host organism and another organism which lives on the external surface of the host. In parasitism, an organism lives on, and derives its nutriment from, a host organism. The host organism usually is damaged in the process. Abstractor's note] Observations of commensalism and parasitism were made of specimens from Texas A. & M. University's experiment shrimp culture project in Brazoria County, Tex., in 1972 and 1973. The facility contains twenty 0.2-ha ponds 1 m in depth. Water from Wharton Camp Bayou is pumped continually through the ponds after filtration through a 31-count mesh sock filter. The shrimp cultured in the Brazoria County project included Penaeus setiferus, P. vannamei, P. occidentalis, and P. aztecus. Specimens of shrimp were also examined from a culture project in Corpus Christi, Tex.

9.16 (1.81) FERTILITY OF MALE OYSTER GAMETES AFTER FREEZE-THAWING

Hwang, Shuh-Wei (The American Type Culture, 12301 Parklawn Drive, Rockville, MD 20852), and Huei-Pin Chen
Fisheries Series No. 15, 1-5 (Nov. 1973). Chinese-American Joint Commission on Rural Reconstruction, Taipei, Taiwan, Republic of China.

Technical development in the application of ultralow temperature in preserving the gametes of various organisms will increase man's capabilities for conveniently maintaining high-quality seed stocks for reproduction. In this present study, the response of oyster milt to the freezing process in the presence of cryoprotectants was examined. Glycerin and dimethyl sulfoxide (DMSO) were the protectants used in the experiments in concentrations of 20, 15, 7.5, 6.6, 5, and 3.3%. The diluent was marine saline in the following formula: NaCl, 1.35 g; KCl, 0.06 g; $NaHCO_3$, 0.02 g; $CaCl_2$, 0.025 g; $MgCl_2$, 0.035 g; and distilled water, 100.00 ml. The milt from male oysters (Crassostrea gigas) was collected and mixed with the cryoprotectants and distributed in freezing vials. The freezing process with liquid nitrogen (-196° C) was extremely fast and uncontrolled. The vials were plunged into the liquid and held for about 1 min. After freezing, the vials were thawed in a water bath at 20°-24° C. A mass of oyster eggs in a beaker was exposed to the thawed milt mixed with seawater at room temperature (28°-34° C). Fertilized eggs were observed and counted after about 5 to 7 h.

The results indicate that DMSO gave much more protection against freezing than did glycerin. The highest fertilization of eggs came from milt that had

9.16 (1.85)(9.15)

Ectocommensals that were observed with relative frequency on the shrimp were species of protozoa genera Zoothamnium, Epistylis, and Acineta, and filamentous bacteria. Less frequently observed was a species of the protozoan Lagenophrys. Commonly found in some shrimp were trophozoites [a stage in the life history of the parasite] of Nematopsis penaei. Zoothamnium species were typically located on the gills of shrimp and occasionally on the exterior in light numbers. Species of Epistylis and Acineta were rarely found on the gills. Filamentous bacteria found on shrimp tended to concentrate on the body areas beset with setules [short hairs or bristles]. When the burden of bacteria was very heavy they were also found on the gills. A species of Lagenophrys was observed on the exterior surfaces of the shrimp. N. penai in the trophozoite stage was very common in the intestine of the shrimp. The isopod parasite Probopyrus pandalicola was commonly encountered on a small shrimp, Palemonetes pugio, found in the ponds. The parasite was not observed on any of the Penaeus species of shrimp. Other workers suggest that since the gills are the favored sites of attachment for species of Zoothamnium, these organisms are responsible for shrimp mortality when shrimp gills are heavily burdened with the ectocommensals in low oxygen situations. SW

9.16

The researchers found that Macrobrachium zoea, Carcinus zoea, late stage Balanus and Elminius nauplii, adult Temora, and Artemia can rupture the capsule walls and ingest the contents (sometimes along with the crushed outer membrane), provided they were supplied in the correct size range of 20 to 250 µm. The ideal capsule, the authors indicate, should have an impermeable membrane that can be either ruptured mechanically or broken down by digestive activity. Nevertheless, much can be accomplished with the present microcapsules in spite of their permeability. For example, capsules containing starch and protein could be used as artificial food particles along with natural food organisms to furnish certain essential nutrients such as vitamins.
[3 figures, 12 references] FTP

9.16 (1.81)

been protected with a 7.5% concentration of DMSO. Almost 79% of the oyster eggs had been fertilized. In the absence of cryoprotectants the undiluted milt was able to fertilize 39.49% of the eggs, demonstrating that cryoprotectant were not absolutely necessary for the freezing of oyster milt. The fertility of the non-frozen milt was 40.07% and much lower than the frozen milt protected with DMSO.
[1 table, 3 references] SW

9.16 BRINE SHRIMP HATCHERY

Seasio, Robert; assignor to Metaframe Corp., Maywood, N.J. (pat.)
U.S. Patent 3,738,316
Official Gazette of the United States Patent Office 911, No. 2, 474-475 (June 12, 1973)

This brine shrimp hatchery contains two receptacles. The first receptable is for confining the brine shrimp egg-laden fluid. The second receptacle is operatively associated with the first and serves to entrap the brine shrimp hatched in the first receptable. FTP

9.16

state collected by net. Following these experiments, almost all larvae of marine fish could be reared by the methods demonstrated on the diet of combined rotifer and copepod. At present, the sequential changes of diet with respect to the development of cultivated fish from larvae to fingerlings seems to be as follows: (1) oyster or mussel larvae; (2) mass cultured rotifer; (3) zooplankton collected by tow net (mainly copepods), and cultured Trigriopus japonicus, or Artemia salina nauplii; and finally (4) minced fish meat. In the case of several cultivated marine species of fish with large sized larvae, they are able to be reared without the first food in the sequence consisting of oyster or mussel larvae. Since the technique of the mass culture of the rotifer has nearly been established, the next step is the development of a successful technique for the artificial culture of the copepoda and cladocela on a large scale. Without this development the mass production of marine fish seed is not feasible. SW

9.16 (9.15) TOXAPHENE ACCUMULATION IN FISH IN LAKES TREATED FOR ROUGH FISH CONTROL

Hughes, Robert A., and G. Fred Lee (Univ. Wisconsin, Madison, Wis.)
Chemical Abstracts 80, No. 5, 23323y (Feb. 4, 1974)

9.16 SEA-WATER SYSTEM DESIGN AND OPERATIONS OF THE (0.8) MARINE CULTURE LABORATORY, GRANITE CANYON

Ebert, Earl E.; Arthur W. Haseltine, and Randolph O. Kelly (Marine Resources Region, California Dept. of Fish and Game)
California Fish and Game 60, No. 1, 4-14 (Jan. 1974)

A new marine culture laboratory was established on the central California coast south of Monterey. It has a dual seawater intake and delivery system of [7 figures, 1 reference] FTP the main components described and the operations of the laboratory, the subsystems designed especially to withstand strong surf conditions. The pedestal mounted, multiple-stage sand filter and the continuous flow degasifier, "hooded chilled, nutrient-enriched, continuously recirculated, pressurized seawater" provides for filtered,

9.17 A TOOL FOR USE IN MAKING LAND MANAGEMENT DECISIONS INVOLVING TIDAL MARSHLAND

Pope, R. M., and James G. Gosselink (Center for Wetland Resources, Louisiana State University, Baton Rouge, La.)
Coastal Zone Management Journal 1, No. 1, 65-74 (Fall 1973)

Marshlands are productive ecosystems and also are nursery grounds for estuarine-dependent marine fisheries. There are strong demands on coastal areas for housing, industrial development, highways, and other activities that are in conflict with the existence of the marshland. Because of these competing interests, development of national techniques is necessary to evaluate land use options and to take into account all the costs and all the values associated with a particular use. A rationale and technique for assigning a dollar value to tidal marsh are described, and land management studies using the technique to evaluate alternative uses are demonstrated.

In previous studies, the authors evaluated, in cash terms, actual and potential uses of the marshland. Cash benefits in terms of fisheries production, sport fishing, and other recreational use did not total more than $100 per acre per year. Application of aquaculture techniques such as oyster culture would realize about $1,000 per acre per year. Used as an area for tertiary treatment of sewage, the worth of the marshland could be valued at over $2,500 per acre per year. A ratio of product to energy was used to equate the photosynthetic organic matter production of a tidal marsh to a cash value; the total life support value was calculated to be $4,000 per acre per year.

9.17 NEW SOURCES OF PROTEIN FOR HUMAN AND ANIMAL FEEDING

Loosli, J. K. (Cornell University, Ithaca, N.Y.)
BioScience 24, No. 1, 26-31 (Jan. 1974)

Malnutrition is the major contributer to child mortality in developing countries. The lack of protein is the most common deficiency in human and animal diets. High protein foods from either plant or animal origin are scarce and expensive in these countries. Agencies of the United Nations and private and public research institutions have provided increased information necessary to mitigate protein and calorie malnutrition. Any long-term solution to malnutrition in the developing countries must include population control in addition to increasing the amount and quality of food supplies. The increase in production of wheat and rice called the green revolution has brought adequate supplies to some countries. The research and development techniques that produced the green revolution are now being extended to other food crops and to animal culture. Special research is being directed to the development of larger supplies of high protein foods by making better use of fish protein, soy beans, and other legumes. There is critical need for more research to generate more knowledge required to expand and improve the efficiency of animal production in relation to the 64% of the earth's surface not suitable for cultivation of food crops. Development of single cell protein from yeast, bacteria, and algae using petroleum byproducts, industrial and domestic wastes, and crop residues as sources of nutrients could contribute to animal production and thus to increase food protein supplies. Chemical synthesis of urea and

9.17 WETLANDS PRESERVATION AND MANAGEMENT ON CHESAPEAKE BAY: THE ROLE OF SCIENCE IN NATURAL RESOURCE POLICY

Walker, Richard A. (Dept. of Geography and Environmental Engineering, Johns Hopkins University, Baltimore, Md.)
Coastal Zone Management Journal 1, No. 1, 75-101 (Fall 1973)

Within the last decade, proponents of wetlands preservation have persuaded legislatures in several states to enact laws that will restrict the alteration of wetlands. The term "wetlands" is not clearly defined, and neither is the meaning of wetlands as a political issue. Wetlands protection has many parallels with the Forest Conservation Movement in the early part of this century. Management of both resources have been promoted politically on the basis of contemporary scientific knowledge. Much of the past knowledge of forest hydrology and ecology was found to be in error by Hugh M. Raup [Journal of Ecology 52 (Suppl.), 19-29 (Mar. 1964)], and Ashley Schiff [Fire and Water: Scientific Heresy in the Forest Service, Yale University Press, New Haven (1962)]. Are we immune to such error today in regard to wetlands preservation? Thus far, the natural sciences have dominated the input into wetlands policy. The ability of science to generate information necessary for social policy concerning natural systems is more limited than is commonly recognized. There has been little self-criticism by the scientific community as to its limits in providing valid information for public policy. This paper attempts to develop such a critique.

9.19 CHEMISTRY OF ORGANOMERCURIALS IN AQUATIC SYSTEMS

Baughman, George L., John A. Gordon, N. Lee Wolfe, and Richard G. Zepp (Southeast Environmental Research Laboratory, U.S. Environmental Protection Agency, Athens, GA 30601)
Report No. EPA-660/3-73/012, 97 pp. (Sept. 1973). National Environmental Research Center, U.S. Environmental Protection Agency, Corvallis, OR 97330). For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. $1.30

Kinetics in water of some chemical and photochemical reactions postulated as key transformations in the environmental mercury cycle were investigated. Decomposition of dimethylmercury (DMM) and diphenylmercury by acids and mercuric salts were shown to be pH dependent and too slow to be significant under most environmental conditions. Degradation of organomercuric salts by acid is even slower. Theoretical evidence indicates that loss of elemental mercury or DMM at the air-water interface can be important in turbulent systems.

Dimethylmercury, methylmercuric chloride, methylmercuric hydroxide, and methylmercuric ion were not decomposed by sunlight, but phenylmercury and sulfur-bonded methylmercuric species were readily decomposed to inorganic mercury. Detailed equilibrium calculations indicate that the sulfur-bonded methylmercuric species are the predominant species in natural waters. Quantum yields for these reactions are presented along with a technique for calculating sunlight photolysis rates from laboratory data.

The report also includes a review of the chemical literature concerning the kinetics of chemical and photochemical decomposition of organomercurials.

Authors' abstract

9.17

The first step of the critique is to determine if scientific knowledge is sufficient to justify the popular beliefs on which legislation to protect the wetlands has been based. With regard to the popular belief in high marshland productivity, examples are cited to show that there is insufficient knowledge available to validate the claim. The relationship of wetlands and water fowl is in the same category. Wetlands are said to improve water quality by removing excess nutrients and oxygenating polluted water. The measurements tending to confirm this feature are uncertain. Control of erosion, sedimentation, flooding, and groundwater replenishment are ascribed to wetlands. The best guide for public policy with regard to these hydrological considerations is to evaluate the consequences of replacing the wetlands with landfill or dredged channels; and control of erosion and sedimentation by wetlands is modest and unpredictable.

The basic flaw of scientific management is that it is founded on the necessity of understanding the natural system and not the human system. It is essential that the market system that generates the pressures to develop coastal wetlands be understood and controlled; water-related contributions of wetlands are undervalued by the market, and many activities that could destroy the wetlands are overvalued. Because there is no marketplace for most wetland values, those interested in either preserving or developing them will continue to turn to the political marketplace to fix the value of this resource. Society must choose whether it is worthwhile for people to have the Bay and its fringes for their esthetic enjoyment and recreational inspiration or for condominiums and boat docks. The answer is not obvious.

[3 tables, 49 references] SW

9.17

Based on the marsh evaluating techniques, an example is given of management decision-making in highway construction alternatives through coastal marshes. The cost of a filled roadbed through the marsh and bridged roadways over the marsh are quantified and compared. The considerations involved in the calculations include: costs of construction, estimated value of marsh destruction, and costs of maintenance. The results provide an evaluation of the total costs to society of the various construction alternatives under two estimations of marsh value. If the marshland is valued at $2,500 per acre, a highway on fill with a 2.5-ft-depth spoil removal would cost $86,414; with an 8.0-ft spoil removal the cost would be $209,345. A bridge of poured-in-place concrete would cost $137,544; using prestressed sections the bridge would cost $119,784. These costs are based upon 60 years of use with an interest rate of 5%. Some effects of ecological considerations are not entered in the calculations. For example, hydrological changes caused by a filled roadbed could adversely affect the marshland while the bridge highway would not cause changes in circulation patterns. Additionally, sinking of the marshland would cause the highway to submerge in 60 years; a much larger expenditure for reconstruction would then be required.

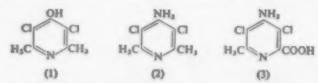
[6 tables, 5 references] SW

9.19 POULTRY MANURE PHYTOTOXICITY
(0.9)

Minchinton, I. R. (Div. of Agricultural Chemistry, 5 Parliament Place, Melbourne 3001, Victoria, Australia), D. L. Jones, and J. P. L. Sang
Journal of the Science of Food and Agriculture 24, No. 11, 1437-1448 (Nov. 1973)

Growers in certain farming regions in Australia reported the presence of a plant toxin in deep litter fowl manure. The crops affected included vegetables, particularly tomatoes, and ornamental nursery crops. In this study, a potent phytotoxic compound was isolated from samples of deep litter poultry manure. It was a nitrogen heterocyclic compound with an attached carboxyl group.

In feeding trials with poultry, the authors demonstrated that an impurity, 4-amino-3,5-dichloro-2,6-lutidine, in the coccidiostat clopidol (3,5-dichloro-2,-6-dimethyl-4-pyridinol) caused a similar phytotoxicity. The impurity appeared to be metabolized by the birds (as demonstrated by increased potency after ingestion), indicating that an active metabolite is formed. The metabolite is probably 4-amino-3,5-dichloro-6-methyl picolinic acid. The chemical and physical characteristics of this metabolite were identical to that of the toxic compound isolated from the deep litter poultry manure samples. The structures of the various compounds discussed are as follows:



(1) Clopidol (2) Major impurity (3) Probable metabolite

[5 figures, 10 references] FTP

9.17

ammonium compounds, which add to the nitrogen in the feeds of ruminant animals, can contribute to milk and meat supplies and help overcome protein deficiencies. Full utilization of all available resources is essential if the problem of protein malnutrition in the developing countries is to be solved in the future.

[16 references] SW

9.19 TREATMENT OF INDUSTRIAL WASTE SOLUTIONS AND PRODUCTION OF USEFUL BY-PRODUCTS USING A PHOTOSYNTHETIC BACTERIAL METHOD
(6.)

Kobayashi, M., and Y. T. Tchan
Wat. Res. 7, 1219-1224 (1973)
Water Pollution Abstracts 46, No. 3, 101, Abstract No. 545 (Mar. 1973)

Results are provided of experiments on treatment of several biochemically active industrial waste waters that include those from starch production, wool washing, fish canning, and fermentations in the manufacture of pharmaceuticals. The waste waters were treated in steps, first with photosynthetic bacteria and then with green algae. A detailed description with illustrations of the treatment plant is included. The bacteria and algae can be harvested and used as animal feed and fertilizer. The harvested photosynthetic bacteria not only provided animal food but also had the effect of increasing survival of fish and increasing egg production in hens. As a fertilizer the bacteria improved the quality and production of citrus fruits. SW

9.19 (7.9) DETERMINATION OF CHLORINATED INSECTICIDES IN SUSPENDED SEDIMENT AND BOTTOM MATERIAL

Goerlitz, Donald F., and Leroy M. Law (U.S. Geological Survey, 345 Middlefield Rd., Menlo Park, CA 94025)
Journal of the Association of Official Analytical Chemists 57, No. 1, 176-181 (Jan. (1974)

Samples of suspended sediment and bottom material from streams are saturated with water and are usually quite different from soils. Thus, procedures for the determination of insecticides in suspended sediment and bottom material must be specifically designed. This paper reports on such a method. In this study, recovery data were obtained on fortified samples and on contaminated bottom materials from several surface streams.

Water was removed from bottom material by centrifugation and from suspended sediment by filtration. The samples are extracted in a moist state. Acetone and hexane are used for the extraction. The acetone is used first; it pervades the mud, disrupting aggregations of clay and organic matter. After mixing the sample, hexane is added; the sample then seems to return to its original consistency, usually permitting adquate solvent recovery by decantation. Coextractives (including polychlorinated biphenyls and polychlorinated napthalenes) are isolated by use of adsorption chromatography. Sulfur interferences are removed with mercury.

The mean recoveries from 8 spiked samples ranged from 75% to 99% for 9 chlorinated hydrocarbon insecticides (aldrin, DDD, DDE, DDT, dieldrin, endrin, heptachlor, heptachlor epoxide, and lindane). The average recovery of chlorinated hydrocarbons from contaminated bottom material samples was 97.9%.

[1 figure, 2 tables, 21 references] FTP

9.19 DDE: ITS PRESENCE IN PEREGRINE EGGS IN 1948

Peakall, David B. (Section of Ecology and Systematics, Cornell University, Ithaca, NY 14850)
Science 183, No. 4125, 673-674 (Feb. 15, 1974)

Data are reported on the presence of DDE in the dried membranes of five eggshells collected in California from 1948 to 1950. From data on the DDE content of the dried eggshell membranes and egg contents of Alaskan eggs, the author was able to estimate the original amount of DDE in the egg content on the wet basis of the California eggs. Comparisons were then made of DDE residue levels and eggshell thickness. The results incidate that at least as early as 1948, DDE was present in peregrine eggs at sufficient levels to account for eggshell thinning.

[1 figure, 1 table, 14 references] FTP

9.19 CHLORINATED HYDROCARBON PESTICIDE RESIDUES IN FOODSTUFFS: COMPARISON OF METHODS

Smart, Nigel A., Alan R. C. Hill, and Patricia A. Roughan (Ministry of Agriculture, Fisheries and Food, Plant Pathology Laboratory, Harpenden, Herts, United Kingdom)
Journal of the Association of Official Analytical Chemists 57, No. 1, 153-164 (Jan. 1974)

A comparison was made of analytical methods for eight chlorinated hydrocarbon pesticides and their metabolites in eight foodstuffs from the standpoint of accuracy and reproducibility. Published methods that have been used extensively and unpublished methods that are likely to be used widely were studied. The foodstuffs examined were milk, butter, cheese, eggs, apples, potatoes, carrots, and cabbages. The pesticides and metabolites determined were BHC, aldrin, dieldrin, heptachlor, heptachlor epoxide, DDE, TDE, and DDT. Three analytical methods were tested with each food. For each method, electron capture gas-liquid chromatography with three different columns was the determinative step and thin-layer chromatography was used as a confirmation procedure. The methods examined were those of the AOAC; M. J. de Faubert Maunder; H. Egan, E. W. Godly, E. W. Hammond, J. Roburn, and J. Thomas; and N. F. Wood. Also, unpublished methods under collaborative study by the European Economic Community were also used. Recoveries of the pesticides by the various methods were determined using both samples with incurred and with added pesticide residues.

9.19 A BIOASSAY OF TOXICITY USING PROTOZOA IN THE STUDY OF AQUATIC ENVIRONMENT POLLUTION AND ITS PREVENTION

Apostol, Simona (Catedra de Igiena, Institutul de Medicina Iasi, Iasi, R.S. Romania)
Environmental Research 6, No. 4, 365-372 (Dec. 1973)

Free-living protozoa have been used as indicators of toxicity in medicine and pharmacology; drug-induced morphological and metabolic changes have been detected using protozoa as the indicators. The protozoa are useful in toxicological investigations because they have the specific features of single cells and whole organisms. They are also abundant in nature. Experiments were performed to develop laboratory techniques using protozoa for the toxicological evaluation of pollutants in short-term and extended exposures. The protozoan indicator used in the experiments consisted of cultures of the ciliate Paramecium caudatum Ehr.

Solutions of the following salts were tested: sodium chloride, potassium carbonate, ammonium nitrate, magnesium sulfate, ferrous orthophosphate, and lead acetate. The concentrations ranged from 1.0 mg/l to 10,000 mg/l in tenfold increases. In the short-term (acute) exposure tests, 0.1-0.2 ml of protozoal culture in kohlrabi medium was added to the different concentrations of the salt solutions, and the exposure time was 5 h. Samples for microscopic examination were withdrawn at 5-10 min intervals in the first hour and then at 15-30 min intervals. The major changes in morphology and motility of the protozoa were recorded. The immobilization of the organism preceding cell disintegration was used as the endpoint of the toxic reaction. In the long-term (chronic) exposure tests the cultures were maintained at 22°-24° C for 15 days. Samples were withdrawn for examination daily.

9.19

The data indicated no gross discrepancies in the results obtained by the different methods; however, in certain foodstuffs and in certain situations some methods appear preferable to others. From the general trend of the results the authors indicate the appropriate method(s) for determining the chlorinated hydrocarbon pesticides in a single foodstuff or group of foodstuffs.
[17 tables, 15 references] FTP

9.19

The results of the acute tests were indicated by the changes in the test organism such as increased excitation and "reflexoid" alterations of the body, body deformations, and plasmolysis of the cell. Results of the chronic tests over a longer period of time showed modifications of the test organisms in vitality, reproduction, and degree of resistance to the toxic environment. Comparing organisms in the toxic solutions to control cultures provided an assessment of the toxicity of the polluting agent. Of the salts tested magnesium sulfate and ferrous phosphate were the least toxic since the test organism was growing in a level of 10,000 mg/l although the development was delayed and the count was low. The minimum concentration of sodium chloride and potassium chloride tolerated by the organism was 1,000 mg/l. Lead acetate and ammonium nitrate at a level of 100 mg/l permitted only limited growth; these two compounds were the most toxic of the series.

The author suggests the test organism P. caudatum is useful in examination of water pollution.
[4 figures, 2 tables, 17 references] SW

9.19 QUANTITATIVE SHIFTS OF LIPID FRACTIONS IN THE SKELETAL AND CARDIAC MUSCULATURE OF CARP UNDER THE EFFECT OF SODIUM (2,4-DICHLORONPHENOXY)ACETATE (2,4-D SODIUM SALT)

Freimane, T., and V. Plaxpira (U.S.S.R.)
Chemical Abstracts 79, No. 13, 74608g (Oct. 1, 1973)

9.19 THE ECOLOGY OF CHONDRUS CRISPUS AT PLYMOUTH, MASSACHUSETTS. III. EFFECT OF ELEVATED TEMPERATURE ON GROWTH AND SURVIVAL

Prince, Jeffrey S., and John M. Kingsbury (Division of Biological Sciences, Cornell University, Ithaca, NY 14850)
Biological Bulletin 145, No. 3, 580-588 (Dec. 1973)

A nuclear thermoelectric generating plant is under development on the coast of the state of Massachusetts, and the thermal discharge area off the coast is in the midst of one of the principal commercial beds of C. crispus (a marine alga). In the present study Chondrus was cultured under controlled conditions at a growth rate approximating that in nature in order to determine the effects of elevated and of depressed temperatures on growth and survival. Parts I and II of this series by the authors on the growth and reproductive responses of the natural population of marine algae at the same location are being published in the American Journal of Botany.

C. crispus was cultured in the laboratory under conditions of light intensity, photoperiod, mineral nutrition, and temperature approaching or slightly exceeding those for a subtidal population of this marine alga off Plymouth, Mass. Of the various conditions, only temperature beyond a certain point brought about reduced growth or mortality of the alga. There is a sharp break in the growth curve between 21.1° and 23.9° C, at which time morphological abnormalities appear. Cultures of C. crispus do not grow at all at 26° C. As the temperature of the environment is elevated above 21.1° C, the healthy spores die rapidly in cultures. All the healthy spores die when exposed to temperatures above 35°-40° C, even when exposed for periods as short as 1 min.
[2 figures, 16 references] FTP

9.19 OPTIMAL PLANNING FOR A THERMAL DISCHARGE TREATMENT SYSTEM

Dracup, John A., and Thomas J. Fogarty (Engineering Systems Dept., University of California, Los Angeles, CA 90024)
Water Resources Research 10, No. 1, 67-71 (Feb. 1974)

Thermal pollution is harmful to the biological environment of a river or lake. In this study, a situation is assumed where all the costs due to thermal pollution are borne by an electrical utility company discharging heated water into a river. The objective of the study is to minimize the cost of treating water that is considered to be a thermal pollutant. Mathematical models were used in solving the problems. One of the constraints on minimizing the costs of treatment was the requirement to maintain the temperature of the river water below a specified maximum.

The results of the study indicated that the effects of a bypass piping system on the temperatures within the river should be considered. The system consists of piping waste heated water downstream to the reaches of a river where the regenerative powers of the river can reduce the level of thermal pollution to such an extent that more waste water may be discharged. The model also indicated that the bypass piping system allows the beginning and end temperatures of a section of the river to be controlled. The results of the model simulation of the bypass piping system significantly reduced the cost of treating heated waste water from the plant.
[2 tables, 7 references] SW

9.19 ABSORPTION OF CADMIUM, COPPER AND ZINC BY DOG WHELKS IN THE BRISTOL CHANNEL

Stenner, R. D., and G. Nickless (Dept. of Inorganic Chemistry, School of Chemistry, University of Bristol, Bristol BS8 1TS, England)
Nature 247, No. 5438, 198-199 (Jan. 25, 1974)

Previous work has demonstrated unusually high levels of certain heavy metals, especially cadmium, in littoral flora and fauna of the Bristol Channel, England. In this study, the researchers carried out an experiment to determine the absorption of cadmium, copper, and zinc by the dog whelk, Nucella lapillus, (a marine snail) in the Bristol Channel. One hundred and twenty dog whelks were collected at Beer in Dorset County. Ten of the specimens were analyzed for cadmium, copper, and zinc content, and the remaining 110 were released in the Bristol Channel at St. Andrew's Head, North Somerset County. Samples were retrieved after 1 week and thereafter at monthly intervals for about a total of a little over 4 months. The levels of metals in the specimens were determined by atomic absorption spectrophotometry.

The level of cadmium in the dog whelks increased at a slower rate than did the zinc. At the end of 4 months, the cadmium level in the transplanted dog whelks was increasing steadily, but it was still significantly lower than that in the native specimens. By the end of the second month, the levels of the zinc in the transplanted samples was about the same as that in the native samples. The level of the copper in the transplanted dog whelks remained considerably lower than that in the native specimens. Some data are shown in the table that follows.

9.2 (9.3) A SIMPLE BIOECONOMIC FISHERY MANAGEMENT MODEL: A CASE STUDY OF THE AMERICAN LOBSTER FISHERY

Fullenbaum, Richard F. (Executive Office of the President, Office of Management and Budget, Washington, DC 20503), and Frederick W. Bell (Economic Research Div., National Marine Fisheries Service, NOAA, Washington, D.C.)
Fishery Bulletin 72, No. 1, 13-25 (Jan. 1974)

The pressures of world expansion have led to more intensive exploitation of living marine resources as a source of protein. The exploitation of these common property resources leads, in many cases, to overfishing and depletion. This paper attempts to develop a simplified management tool to prevent overexploitation and depletion of a fishery resource. A general resource model is postulated embracing both biological and economic relationships. This bioeconomic model approximates the operation of a fishery under free access to the resource. A Schaefer type yield function is combined with a linear demand function, and other standard economic relationships and simulations are performed to evaluate the model. Using computer simulation, we imposed five management strategies on the case example, the American lobster fishery. These strategies include (1) freezing fishing effort by raising license fees; (2) reducing fishing effort to that necessary to harvest at the maximum sustainable yield by raising license fees; (3) reducing fishing effort to an "economic optimum" where marginal cost of doing business is equal to marginal revenue from sales by raising license fees; (4) instituting a "stock certificate plan" where individual fishermen would own portions of the resource and trade catch certificates on the open market; however, the total number

9.19 (7.9) EXTRACTION OF POLYCHLORINATED BIPHENYLS: EVALUATION OF A COLUMN TECHNIQUE APPLIED TO POLAR BEAR AND SEAL TISSUE

Bowes, Gerald W., and Jennifer A. Lewis (Toxic Chemicals Section, Canadian Wildlife Service, Ottawa, Ontario, Canada K1A 0H3)
Journal of the Association of Official Analytical Chemists 57, No. 1, 138-144 (Jan. 1974)

Because the physical and chemical characteristics of PCB are similar to those of many chlorinated pesticides, the various extraction procedures and solvents used for pesticides have also been applied to PCB. R. J. Hesselberg and J. L. Johnson [Bull. Environ. Contam. Toxicol. 7, 115-120 (1972)] proposed a column extraction procedure. In the present study, the column technique was tested for the extraction of PCB from polar bear and seal liver and fatty tissue and from the bearded seal fat. Two solvent systems were used: hexane and chloroform-methanol. For comparative purposes two other extraction procedures were also used: (1) digestion with hot glacial acetic-perchloric acid, followed by extraction with hexane and (2) extraction with acetone and hot isopropanol (2-propanol) (considered to be the standard method of comparison). DDE (2,2-bis (p-chlorophenyl)-1,1-dichloroethylene) was found in the tissues examined, and its level was also quantitated for comparative purposes.

The column technique was quite satisfactory for extracting PCB and DDE from the animal tissue. Extracting a sodium sulfate-tissue mixture with hexane in a column was as effective in recovering PCB and DDE from polar bear and seal fat as was the standard method of comparison (acetone-isopropanol), but was slightly less

9.6 (9.1) FISHERIES AND WILDLIFE DEPARTMENT, VICTORIA: LIST OF PUBLICATIONS, 1911-1971

Anonymous
Fisheries and Wildlife Information Publication, Victoria, No. 4, Ministry of Conservation, Fish and Wildlife Div., 632 Bourke St., Melbourne, Victoria, Australia 3000 (Apr. 1973), 52 pp.

This bibliography lists 480 publications by authors within the following series (number in paranthesis is the number of publications in the series): publications (350), Fisheries Pamphlets (4), Fisheries Contributions, Victoria (28), Fauna Reports (6), Fauna Contributions (8), Wildlife Contributions (13), Fisheries Circulars (19), Wildlife Circulars (31), Fisheries and Wildlife Papers (1), Miscellaneous Papers (8), and General Circulars (12). FTP

9.19 (7.9)

(2-4%) in extracting them from the liver. It appears that PCB and DDT compounds are associated with the nonpolar lipid component in the cell. The authors believe that, in the analysis of biological tissue, considerable time and money can be saved by extracting PCB and DDT compounds from liver and fat in a column with a simple solvent, hexane.
[2 figures, 3 tables, 8 references] FTP

9.19 IDENTIFICATION OF SUBSTANCES IN PETROLEUM CAUSING OBJECTIONABLE ODOR IN FISH

Ogata, Masana, and Yoshio Miyake (Med. Sch., Okayama Univ., Okayama, Japan)
Chemical Abstracts 80, No. 6, 30411d (Feb. 11, 1974)

9.19

Details of the dog whelk samples	Date of sampling	Heavy metal content (avg)		
		Cadmium	Copper	Zinc
		p/m	p/m	p/m
Specimens from Beer before transplanting	4/8/1973	36	70	345
Specimens transplanted at St. Andrew's Head in Bristol Channel	4/18/1973	40	140	620
	5/6/1973	63	175	1,400
	6/2/1973	92	120	2,000
	7/1/1973	135	113	2,800
	7/29/1973	184	200	3,200
	8/27/1973	211	170	2,530
Specimens native to Bristol Channel	12/-/1973	460	740	3,090
	8/28/1973	780	905	2,900

[2 tables, 5 references] FTP

9.6 A BIBLIOGRAPHY OF AFRICAN FRESHWATER FISH

Matthes, H. (Freshwater Fisheries Research and Training Institute, Mwanza, Tanzania) Food and Agriculture Organization of the United Nations, Via delle Terme di Caracalla, Rome, Italy (1973), 299 pp. US$10.00, £4.00, FF50.00.

This appears to be the first indexed bibliography of African freshwater fish species. It includes publications relating to or dealing with indigenous and introduced species of fish in the fresh waters of Africa and Madagascar, marine or brackish water fish occurring regularly in fresh waters, paleontology of African freshwater fish, and limnology in the African context. The bibliography is accompanied by a subject index, a geographic index, a zoogeographic area index (by river basins), and a taxonomic index. The bibliography contains 4,816 references.
FTP

9.2 (9.3)

of catch certificates would not exceed the maximum sustainable yield; and (5) doing nothing. The economic impact in terms of catch, fishing effort, number of fishermen, ex-vessel prices, license revenues, and returns per boat and fishermen were computed for each management strategy so that policymakers and industry leaders could see the alternative consequences of these management positions. The simplified model also is available for use in evaluation of other management schemes that might be suggested.

The authors conclude that for the American lobster resource, there is every indication that the fishery has achieved maximum sustainable yield and is fully capitalized. This has been brought about by a rapid expansion in effort (i.e., traps fished) produced by (1) free access to the resource, (2) a rising market for lobsters of all species, and (3) a secular decline in seawater temperature. The choice of management strategy to conserve and to efficiently use the resource is in the public domain and beyond the scope of this study; nevertheless, the authors pointed out the economic alternatives.
[3 figures, 2 tables, 13 references, appendix]
[Authors' abstract; and an abstract of part of the conclusions]

0.8 FATIGUE CRACK PROPAGATION IN 0°/90° E-GLASS/EPOXY COMPOSITES

Mandell, John F., and Urs Meier
Report No. MITSG 73-4, Massachusetts Institute of Technology, Cambridge, MA 02139 (Nov. 30, 1973), 29 pp.

[Since boat hulls and other equipment are fabricated from glass fiber reinforced plastics, knowledge of the structural characteristics of these materials would be beneficial. Abstractor's note] The growth of cracks under the influence of cyclic loading is a problem of great engineering importance in structural applications involving relatively brittle materials. The material investigated in this study, was a glass fiber-epoxy undirectional composite, 5 plies thick, with each ply at a 90° angle to the adjacent ply. Specimens were cut from the cured laminate, notched, and subjected to cycled tensile stresses. Fatigue crack propagation appears to occur by the successive failure of ligaments at the crack tip. Crack propagation is defined as extension of the main crack by fracture of fibers in the 0° plies, as distinct from splitting parallel to the fibers in the 0° or 90° plies or delaminations between plies. The rate of crack growth was predictable on the basis of a mathematical model that was constructed from a simple theory. The theory is restricted to a laminate under pulsed tension loading conditions. Good agreement was demonstrated between the predicted rate of crack growth and results of the experiments. References and figures graphically showing the cracking data are included. SW

8.8 STANDARDS

[Product and country as listed below.]
Food Science and Technology Abstracts 5, No. 12,(Dec. 1973)

Specification for Pomfret Canned in Oil [India], Indian Standard IS:2168, Indian Standards Institution, New Delhi, India (1971), 28 pp. Price Rs 8.00. Abstract No. 12U847, p. 168.

Specification for Mackerel (Rastrelliger sp.) Canned in Oil [India], Indian Standard IS:2420 (1971), 8 pp. Price Rs 3.00. Abstract No. 12U848, p. 168.

Specification for Sardines (Sardinella sp.) Canned in Oil [India], Indian Standard IS:2421 (1971), 8 pp. Price Rs 3.00. Abstract No. 12U849, p. 168.

[Frozen Tuna, Sailfish, Mackerel, Marlin and Swordfish] [USSR], Soviet Standard GOST 17661-72, Gosudarstvennyi Komitet Standartov, Moscow, U.S.S.R. (1972), 4 pp. Abstract No. 12U860, p. 170.

[Sliced Cold Smoked Sturgeon (Balyk). Quality Requirements for Attested Products] [USSR], Soviet Standard GOST 5.1429-72 (1972), 3 pp. Abstract No. 12U867, p. 171.

FTP

9.3 UNITED STATES OCEANS POLICY: PERSPECTIVES 1974

Knight, H. Gary (Louisiana State University Law Center)
Notre Dame Lawyer 49, No. 2, 241-275 (Dec. 1973) [Published by the Notre Dame Law School, Box 486, Notre Dame, IN 46556]

The underlying premises leading to the United States' oceans policies have been varied and are still changing. U.S. policy began as a reaction to the Maltese initiative in the United Nations, and for a time it was defensive in nature. Then it developed in response to defense considerations and was oriented to national security matters. During the past several years the policy has shifted away from defense pressures toward resource extractive interests. Thus the policy appears to have a patchwork-quilt quality due to shifting emphasis generated by the Administration on domestic and foreign matters.

After the introduction, the article is arranged into the following topic areas: (1) Sources of U.S. policy, (2) Description and discussion of policy objectives (a) Nonliving marine resources, (b) Fisheries, (c) Territorial Sea breadth: navigation and overflight on the high seas and through international straits, (d) Freedom of scientific research, (e) Protection of the marine environment, (3) Congressional endorsement, and (4) Conclusion.

The author's purpose in preparing this article was to provide a factual discussion of U.S. oceans policy in the hope that more people will be in a position to take an active role in shaping and developing that policy as it ripens into international law. The annex is the statement by President Richard Nixon, May 23, 1970, on "United States Policy for the Seabed."
[167 footnotes, annex] FTP

9.7 (9.6) THE MARINE COLLECTOR'S GUIDE

Straughan, Robert P. L.
Published by A. S. Barnes and Co., Inc., Cranberry, NJ 08512 (1973), 222 pp.

The marine collector supplies the specimens found in public oceanariums and aquariums, hobbyists aquariums, and science laboratories. This book describes the locations and procedures for collecting every type and variety of marine specimens. The book is useful for those who may wish to be professional collectors and those students or hobbyists who desire to catch their own specimens. Most of the book is about experiences in Florida and Caribbean waters, but the techniques described in the text are applicable to collecting anywhere in the world. The subjects covered include the basic equipment necessary, maintaining the specimen after capture, and marketing the specimen. Additional subjects cover collecting seahorses, invertebrates, and corals; advice on where to collect them is also given. Information on packing and shipping of fish and other specimens is also given. The author forewarns a prospective collector by describing the problems that could beset him and augments the warnings with his own experiences in "A Lifetime in the Sea," the last chapter. An extensive list of organisms, from Abudefduf saxatilis, the sergeant major fish, to Zanclus flavescens, Pacific yellow tang, gives information on locating them in the wild and feeding them after capture. An index and a short list of references with suggested reading are also provided. There are many photographs, a few in color, illustrating the text. SW

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